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THE JOURNAL of The Department OF AGRICULTURE

VICTORIA · · · AUSTRALIA

Vol. XLII.—Part I. JANUARY, 1944. PRICE, 3D.

Vol. XLII.—Part 12. DECEMBER, 1944. PRICE, 3D.

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Issued by direction of Hon. N. A. Martin, M.L.A., Minister of Agriculture.

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POSTAGE RATES

The postage required for this issue is:—To Australia and New Zealand, 1½d.; to United Kingdom, 2½d.; to United Kingdom via All-sea route, 1½d.; to other British Possessions, 2½d.; to U.S.A. and Foreign Countries, 3½d.

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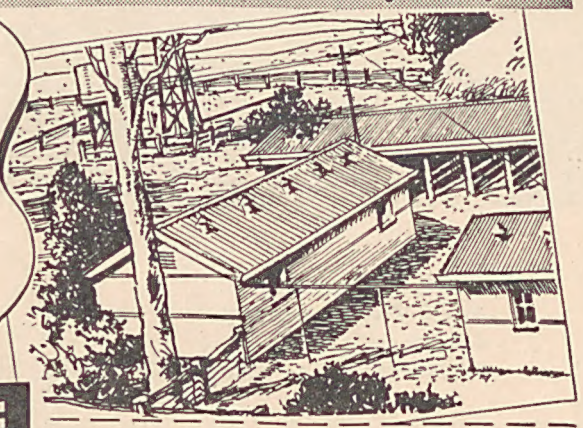

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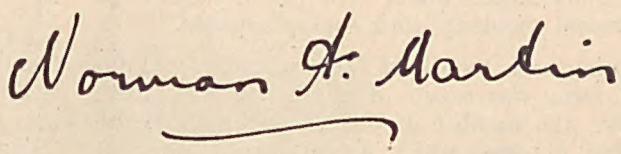
A New Year Message

For four years Australian farmers have been doing a job without which the magnificent effort of our soldiers in the front line would not have been possible. Food is the most vital of all munitions of war, and maintaining supplies of food sufficient to meet all our commitments has been a huge task and one that has been made more difficult by shortages of fertilizer and other essential materials and, particularly, by shortages of manpower.

But, by their untiring efforts, the men and women who have remained to till our farms and tend our herds have managed to maintain production at a level sufficient to meet the needs of the Armed Forces based on this country and of our civilian population. Despite wartime difficulties, production of crops previously grown to a limited extent only has been expanded many times over to meet the ever increasing needs of the services. Flax production in Victoria has increased from two thousand to thirty-two thousand acres, vegetable production has been more than doubled, potato growers this year have planted seventy-five thousand acres compared with thirty-two thousand in 1939 and new crops like navy beans, blue peas and mustard, are being produced in Victoria at the rate of more than four thousand tons a year.

And now comes an appeal for still greater production to meet not our own needs—but those of our kin in Britain. Britain's need is already known to you. You know how, through four years of war and suffering, the British people have lived, worked and fought on rations that have been barely sufficient to sustain them. You have heard, too, that with victory in sight, the maintenance of even those meagre rations is threatened unless Australia can ship substantial quantities of butter and other dairy produce, of meat and of eggs. Under any other circumstances, I would be reluctant to suggest that farmers, already so heavily burdened, should attempt to do more, but I know that this appeal is one we cannot fail to answer. I know too, that the primary producers of Victoria will do all that is humanly possible to ensure that Australia's wartime contribution to Britain's larder will be really worth-while—to ensure that no ship leaving Australia for the home country will sail with empty holds.

We are now upon the threshold of another year, the fifth of the present world conflict. Conjecture as we may, the future remains to us a closed book. Of one thing we are certain, however, the burden of hard work and loss will not lighten in the months ahead—months which Britain's Prime Minister warned us may witness action affecting the destiny of the Empire and of the world for generations to come. But like the people of Britain, we must not falter; as they, we must work with vigour and determination for final victory.



Minister of Agriculture.

A Mineral Feeding Trial with Dairy Cows in the Kiewa Valley

By A. C. T. HEWITT, M.Agr.Sc., Live Stock Science Officer

MINERAL feeding trials to demonstrate any possible advantages to be obtained by adding ground limestone (calcium carbonate) or bone flour (calcium phosphate) to a salt lick for dairy cattle were commenced on eight farms in the Kiewa Valley on the 1st September, 1941. The trials were designed to cover a three-year period, but, unfortunately, they were concluded at the end of August, 1943, as the result of unavoidable circumstances.

All farmers were affected by a shortage of labour, resulting in the withdrawal of one herd after sixteen months, the closing down of two others within the next six months, and several changes of share farmers in three of the remaining five herds.

On all farms most of the pasture was improved and carried a good sole of native and sown grasses and subterranean clover. The pastures had been topdressed regularly with superphosphate.

During each month of the trials, a record for each farm was made of the number of cows milked, the number of other stock carried, the number of cows which calved, the number of cows which contracted milk fever, the number of calves stillborn, the number of calves born prematurely, and the quantities of lick consumed.

The licks were fed in troughs, and it was left to the share farmer to see that these were always available. In most instances only one trough was provided in each paddock for each herd. The eight herds were divided into two groups of three and one group of two. In each of the two groups of three, one herd received salt only; one herd a mixture of salt (two parts by volume) and lime (one part by volume) and the third a mixture of salt (two parts by volume) and bone flour (one part by volume). In the third group, the bone flour mixture was not fed. The minerals fed to herds within each group were changed round on the 1st September, 1942.

Although no conclusive results were obtained, there were indications that, under the conditions of the trial, little or no benefits were obtained by adding lime or bone flour to the salt lick. This may be attributed to the fact that very little mineral was consumed in the trials, the maximum per day being ·66 oz. of salt in one herd and ·68 oz. of salt plus ·31 oz. of lime in the same herd the following year. The average quantities of lick fed to the cows in the various herds are shown in Table 1. The quantities shown include all wastage from the open troughs due to weather, etc.

TABLE 1.

Type of Mineral Fed.	Number of Cows.	Quantity Consumed per Cow per Day.		
		Salt.	Lime.	Bone Flour.
		Oz.	Oz.	Oz.
Salt only	594	·38	..	..
Salt and Lime ..	590	·44	·21	..
Salt and Bone Flour	340	·26	..	·10

Apparently the bone flour reduced the palatability of the lick and diminished the consumption of salt, whereas the lime, if anything, increased it.

The average butterfat production of the cows fed the various mineral mixtures is shown in Table 2 :—

TABLE 2.

Type of Mineral Fed.	Average Butter-fat Production per Cow per Month.
	lb.
Salt	24·45
Salt and Lime	23·24
Salt and Bone Flour	21·96

As far as this trial went, in the groups receiving lime and bone flour the production of the cows was lower than in the groups receiving salt only, and although these results are not conclusive, they do indicate that, where topdressing is practised in the Kiewa Valley, production will not be reduced if lime or bone flour are omitted from the lick.

Table 3 shows the number of calvings, the number of cows with milk fever following calving, the number of stillborn calves and the number of premature calves recorded in the herds receiving the different kinds of mineral licks.

The incidence of milk fever was lowest in the herds fed salt and lime, and highest amongst the cows fed salt only; the number of dead calves was lowest amongst cows fed salt only, and highest amongst cows fed salt and bone flour; and the number of premature calves was lowest amongst the cows receiving the mixed mineral licks. No conclusions are drawn from these figures, because of the spasmodic incidence of milk fever, dead calves and premature births.

These trials were made possible by the willing co-operation of Mr. I. S. Wallace, Kergunyah, Mr. A. F. Macdonald, Gundowring, Messrs. W. J. and A. S. Turner, Red Bluff, and Mr. C. W. Crosthwaite, Huon. These farmers made their herds available, purchased the licks, and kept the records. Mr. R. Ahearn, Manager of the Kiewa Butter Factory, assisted in arranging the trials and in making the salt, lime and bone flour available through the factory.

TABLE 3.

Type of Mineral Fed.	Number of Calvings.	Cows with Milk Fever.		Calves Stillborn.		Calves Premature.	
		Number.	Percentage.	Number.	Percentage.	Number.	Percentage.
Salt	407	38	9·3	13	3·2	28	6·9
Salt and Lime	493	22	4·5	26	5·3	12	2·5
Salt and Bone Flour	290	19	6 6	23	7·9	7	2.4

ARTHRITIS IN LAMBS

By THE VETERINARY STAFF

ARTHRITIS is an inflammation of a joint. Every year there have been outbreaks of this trouble in Victoria, the incidence of the disease varying from district to district, and when climatic conditions are favourable to it arthritis in lambs may occur as an epidemic. Over 50 per cent. of lambs have been affected in some outbreaks.

The disease is characterized by lameness in one or more legs caused by the painful inflammatory condition of the affected joints.

Under good conditions most lambs affected with arthritis will recover if left alone, but considerable loss of condition and wastage may result and a definite "tail" to the lamb flock may be established.

This epidemic form of arthritis is caused by a specific germ known as *Erysipelothrix rhusiopathiae* which gains entrance to the animal's body through marking wounds or the navel, or even by the mouth, generalises in the blood for a period and then localises in the joints causing a painful arthritis. The germ is a fairly common soil contaminant, but is present in much higher concentration in such situations as old sheep camps and yards.

The disease frequently appears in a flock about ten days or so after marking and in a few days a large percentage of the lambs may be showing symptoms. Usually wether lambs are more likely to contract the disease than ewe lambs. Affected animals show a decided disinclination to move about and typical lameness is evident in the endeavour to use the affected limb as little as possible. Lambs may lie down to feed, then rise, move a few feet and lie down again. It is not uncommon for the trouble to move from one leg to another. Loss of condition usually results from partial starvation and death may ensue in bad seasons when there is a tendency for the ewe to desert the lambs. The joints may show little or no detectable swelling. Complete recovery usually takes place in the majority of lambs in about three weeks, although death or deformity may result.

A similar type of arthritis may occur in younger lambs through the same germ gaining entrance to the body via the umbilicus and sporadic cases may occur as the result of wound infection. Another type of arthritis and lameness is sometimes seen, characterized by swollen joints containing pus. Lameness due to other causes such as footrot, grass seeds and accidents can readily be differentiated.

Treatment of lambs affected with epizootic arthritis is rarely practised. Usually they are left in the paddock to take their chance. Natural recovery will take place in about three weeks and, provided the lamb and ewe have not too far to travel for adequate feed, water and shelter, the rest can be left to nature.

As the disease frequently appears as the result of the marking operation, it is obvious that control measures should be associated with that operation. As the germ is a soil contaminant, avoid marking near those areas likely to have a high contamination with the germs causing arthritis. Avoid dusty conditions, mark away from established yards and drop the lambs into a fresh spelled paddock that does not contain established sheep camps.

Instruments should be properly sterilized and marking boards kept as clean as possible throughout the whole operation. Avoid the use of tar or other sticky dressings on marking wounds, as they tend to collect infective dust and dirt. And finally, on those properties where arthritis is known to occur, the use of the bloodless emasculator will eliminate at least one possible channel of infection.

SELF-FEEDERS FOR PIGS

Methods of Construction

By N. C. KILLEEN, B.Agr.Sc., Science Field Officer, and A. R. NICHOLSON, Field Assistant

WITH the present scarcity of labour the value of self-feeders for pigs cannot be over-estimated.

Contrary to a widely held opinion self-feeders do not result in a waste of grain, but rather tend to greater economy, with higher growth rates of pigs and increased turnover.

Self-feeders need to be filled only once in four or five days and eliminate the necessity for twice-daily feeding. Adjustment of feeding rates is automatic and there is no danger of growth rates being restricted by insufficient food supplies. All the pigs will receive as much food as they require and the smaller pigs will not be crowded out by the larger ones.

As pigs reach heavy bacon weights they may tend to become over-fat, and in this event it will be necessary to resort to daily hand-feeding with a restricted diet, but it is possible to carry pigs selected specially for bacon production to very heavy weights before over-fatness becomes evident.

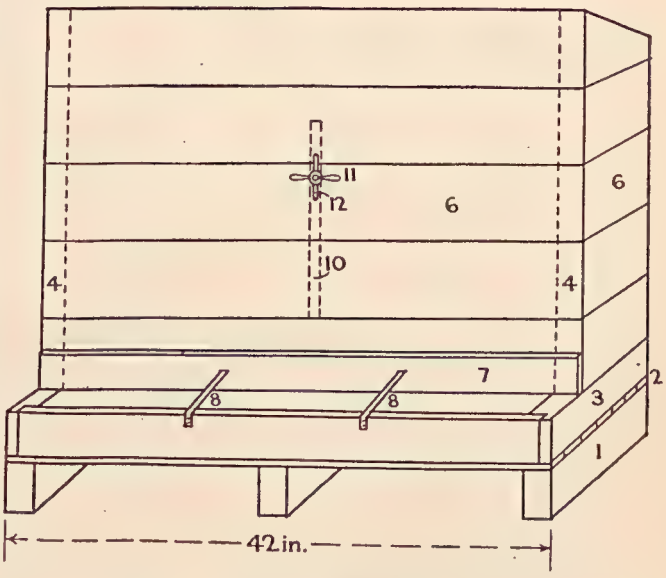
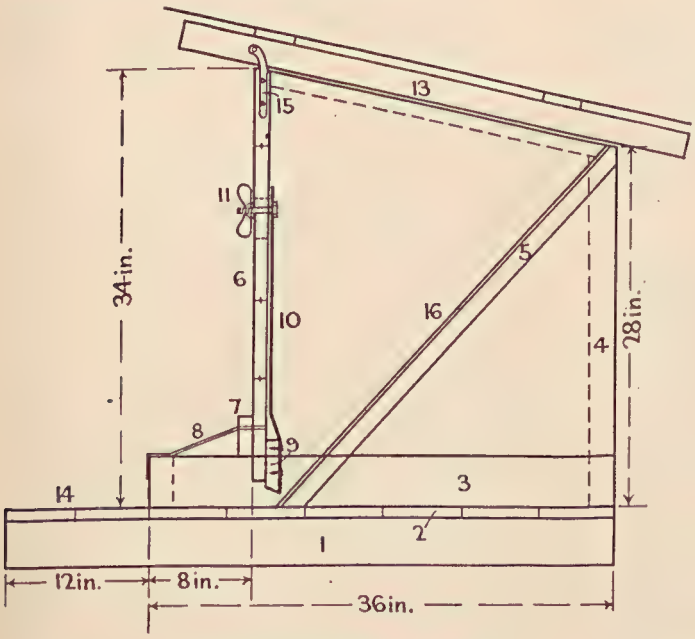


Diagram No. 1—Front Elevation of a Self-feeder for Pigs. (See key to numbers hereunder.)



Side Elevation of Self-feeder.

There are several types of feeder on the market at present and all give satisfactory service. However, the feeders illustrated are suitable to the small pig-raiser and on most farms could be

KEY TO NUMBERS.

1. 4-in. x 2-in. supports.
2. 5¼-in. x ¾-in. tongued and grooved boards (floor).
3. 4-in. x 2-in. base.
4. 3-in. x 2-in. uprights.
5. 2-in. x 2-in. supports for grain slide (3).
6. 5¼-in. x ¾-in. tongued and grooved boards (front and sides).
7. 3-in. x 1-in. reinforcing board.
8. Iron struts.
9. Regulating board.
10. Iron suspender for regulating board.
11. Wing nut and bolt for adjusting regulating board.
12. Slot for adjuster bolt.
13. Roof:—Three lengths of 3-in. x 2-in. and two lengths of 3-in. x 1-in. and either sheet or corrugated iron.
14. Platform.—Optional but recommended.
15. Home made hinge.
16. Sheet metal slide.

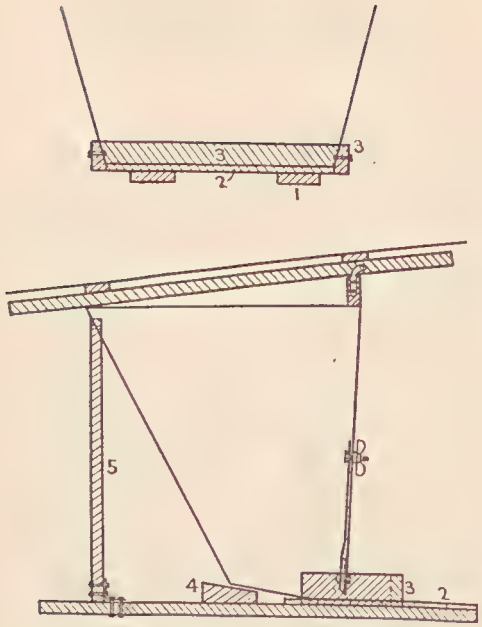


Diagram No. 2—A grain box from a harvester or a header converted to a self-feeder. A piece is cut from the bottom front edge of the box, which is mounted as illustrated.

KEY TO NUMBERS.

1. Two 6-in. x 1½-in. base pieces.
2. Tongued and grooved floor boards.
3. 4-in. x 2-in. front and sides of trough.
4. 3-in. x 2-in. chocks.
5. 2-in. x 2-in. stays.

readily constructed from waste materials, at low cost. The building of such feeders should not be beyond the ability of the average handyman on the farm.

The types of feeder shown in the plans have been constructed and used at the Rutherglen Experiment Farm piggery; both have given highly satisfactory service.

The self-feeder on page 5, is large enough to hold 300 to 400 lb. grain which will feed nine to ten light bacon pigs for approximately a week. There is no hard and fast rule as to size, however, and a feeder can be made on the same lines as shown in the diagram, large enough to hold seven or eight bags of grain suitable for 30 to 40 pigs reared under paddock conditions, or small enough to hold 100 lb. and suitable for feeding a few pigs in the pen.

The size of the feeder is considered to be most suited to the average pig-raiser. An important practical point with this feeder is that it can be shifted fairly conveniently by two men when empty. Larger sized feeders would need to be placed on skids to enable them to be moved about the paddock with a horse. The question of moving feeders is important, particularly if rotational grazing is practised.

To ensure the efficient working of the feeder the following points on construction are important:—

(1) Slope of grain slide should be about 45°; it need not be more. The slide can be constructed of sheet-metal or tongued-and-grooved boards. The former is much cheaper and more likely to be available from scrap.

(2) The bottom of the slide should be immediately below the regulating board. This board is an essential feature of the feeder, because of the fact that different feeds run at different rates, e.g., pollard will run more slowly than wheat. Without this board the grain will run too freely and will be nosed over the edge of the feeding trough. The feeder is working best when the pigs have to nose the grain from beneath the regulator board and when there is only a small quantity of grain in the feeding trough at all times.

The plan has been drawn providing for the use of 6-in. by 1-in. boards, but as these are now unobtainable, costs have been estimated on the use of 5¼-in. by ¾-in. boards. Hardwood should be used throughout; softwood will not stand up to the rough treatment given it by the pigs. For the same reason bolts instead of nails should be used in construction as much as possible.

MATERIAL REQUIRED FOR CONSTRUCTION.

	Approximate Cost.*
	£ s. d.
Feeder—	
22 ft.—4-in. x 2-in. base pieces ..	0 5 0
12 ft.—3-in. x 2-in. uprights ..	0 2 0
20 ft.—2-in. x 2-in. three supports for slide and reinforcements for top of grain box	0 2 6
7 ft.—3-in x 1-in. reinforcing board (front) and regulating board ..	0 0 9
75 ft.—5¼-in. x ¾-in. tongued and grooved boards	1 10 0
Sheet iron slide—3 ft. 6 in. x 3 ft. 6 in.	0 3 0
Roof—	
11 ft.—3 in. x 2 in.	0 1 9
7 ft.—3 in. x 1 in.	0 0 9
Iron—(Corrugated). 3 ft. 6 in. x 3 ft. 6 in.	0 5 0
Total cost of materials ..	2 10 9

* Prices quoted Rutherglen 28th October, 1943. The cost of nuts, bolts, and nails is not included.

TETANUS IN SHEEP

By THE VETERINARY STAFF.

TETANUS is a disease resulting from the contamination of a wound by a specific germ, the tetanus bacillus. The disease (or manifestation of symptoms arising from the infection) is popularly termed "lockjaw" and man and all domestic animals are susceptible.

Although sporadic cases of tetanus may occur at any time in the life of the sheep, the hazards of infection are greatest after marking and after shearing, and it is at these two periods that serious losses from tetanus may occur.

The tetanus bacillus is a ubiquitous organism being present in most soils, and especally those where stable manure has been used as a fertilizer. The germ grows and mutiplies readily in dead organic matter especially that of animal origin such as faeces, dead carcasses and heaps of tails and testes in lamb marking yards. Consequently, shearing sheds and yards usually provide a situation favourable to the growth of the germ. The tetanus bacillus will grow only in dead tissue or decaying matter, where air or oxygen is excluded. When conditions of growth become unfavourable, the germ forms spores which represent a resting stage in its life history. These spores which are markedly resistant to adverse conditions of heat and dryness and to the influence of disinfectants, remain alive for considerable periods. When they lodge in a suitable environment these spores germinate and develop into tetanus bacilli which recommence growth and multiplication.

During growth the tetanus bacillus elaborates a particularly powerful toxin or poison.

Although a wound in which there is some destruction of tissue offers a favourable site for the growth of the germ, the infection may be introduced through a trivial scratch. Further, a normal looking wound which is apparently healing under a scab may harbour tetanus bacilli. Wounds may become infected by dust containing spores, or by contact with infected soil or dirt, or from a contaminated instrument that inflicted the wound. The germ remains strictly localized to the wound and does not invade the tissues. The disease results from the absorption of the powerful toxin formed while the germs are growing in the wound.

The time that elapses between infection and the onset of clinical symptoms is known as the incubation period, and in sheep this varies from three days to three weeks.

The characteristic symptoms of tetanus are muscular spasms produced by the action of the toxin on the nervous system. The inability to open the mouth, which results from spasms of the muscles of the jaws, has given rise to the term "lockjaw" by which tetanus is popularly known.

An affected sheep is usually found apart from the flock and is often down. The limbs and neck are obviously tense and rigid and to touch the animal usually induces a muscular spasm. If an affected sheep is placed on its feet it will run away with a stiff proppy gait and elevated head, to fall in a short distance and lie with legs stiffened, toes widely separated and head and neck drawn back.

In a typical case of tetanus the carcass is so rigid that it can be turned over like a board.

Most sheep affected with tetanus will die and, as the germs present are in an ideal location to flourish and multiply, carcasses should be completely destroyed by burning.

The post mortem findings in a sheep that has died of tetanus are completely negative, except for the wound that has received the infection and even this may be so insignificant that it may easily be overlooked.

It is not likely that treatment of affected sheep would be practised, except in the case of valuable stud animals. Treatment is expensive and the percentage of recoveries small. The patient should be placed in a darkened clean stall and given a full purgative, viz., Epsom salts, 4 to 6 ounces. All wounds should be submitted to thorough surgical cleansing, using peroxide of hydrogen and tincture of iodine. Tetanus antitoxic

serum should be given by or under the directions of a veterinarian. General nursing measures, such as quiet comfortable quarters, a clean water supply, and tempting laxative feeds may assist recovery.

Control

Control of tetanus can be achieved in three ways—first, a maintenance of cleanliness and strict hygienic measures at such times as marking and shearing will greatly reduce the possibility of any contamination of wounds occurring. Marking should not be carried out in old yards, but preferably in temporary yards in the corner of a spelled paddock. Clean, sharp, sterile instruments will leave least tissue damage in the wounds inflicted, and, consequently, the least favourable site for germ growth. The shed and yards should be submitted to a thorough cleansing before shearing commences.

Where tetanus is known to be enzootic, science has provided two further means of control. One is the use of tetanus antitoxic serum in conferring a *passive* immunity, and the other is the use of tetanus toxoid in conferring an *active* immunity. A passive immunity is immediately established followng a prophylactic dose of tetanus antitoxic serum, but this immunity lasts for a period of about three weeks only. This method may be used at marking and/or shearing, and protects the animals for three weeks after the operation. If cases of tetanus are observed a short time after marking or shearing, the immediate injection of tetanus antitoxic serum into the remainder of the flock is recommended.

The use of tetanus toxoid confers a life-long immunity, but this immunity takes about fourteen days to develop and, consequently, the vaccination should be carried out at least a fortnight before operations commence in order to be effective.

The immunization of sheep with tetanus toxoid should be carried out in districts, or on farms where tetanus appears to be endemic, that is, when losses from this cause have occurred regularly. Owing to the time taken for immunity to develop, however, the use of tetanus antitoxin is the method chosen in protecting young lambs from infection at marking time.

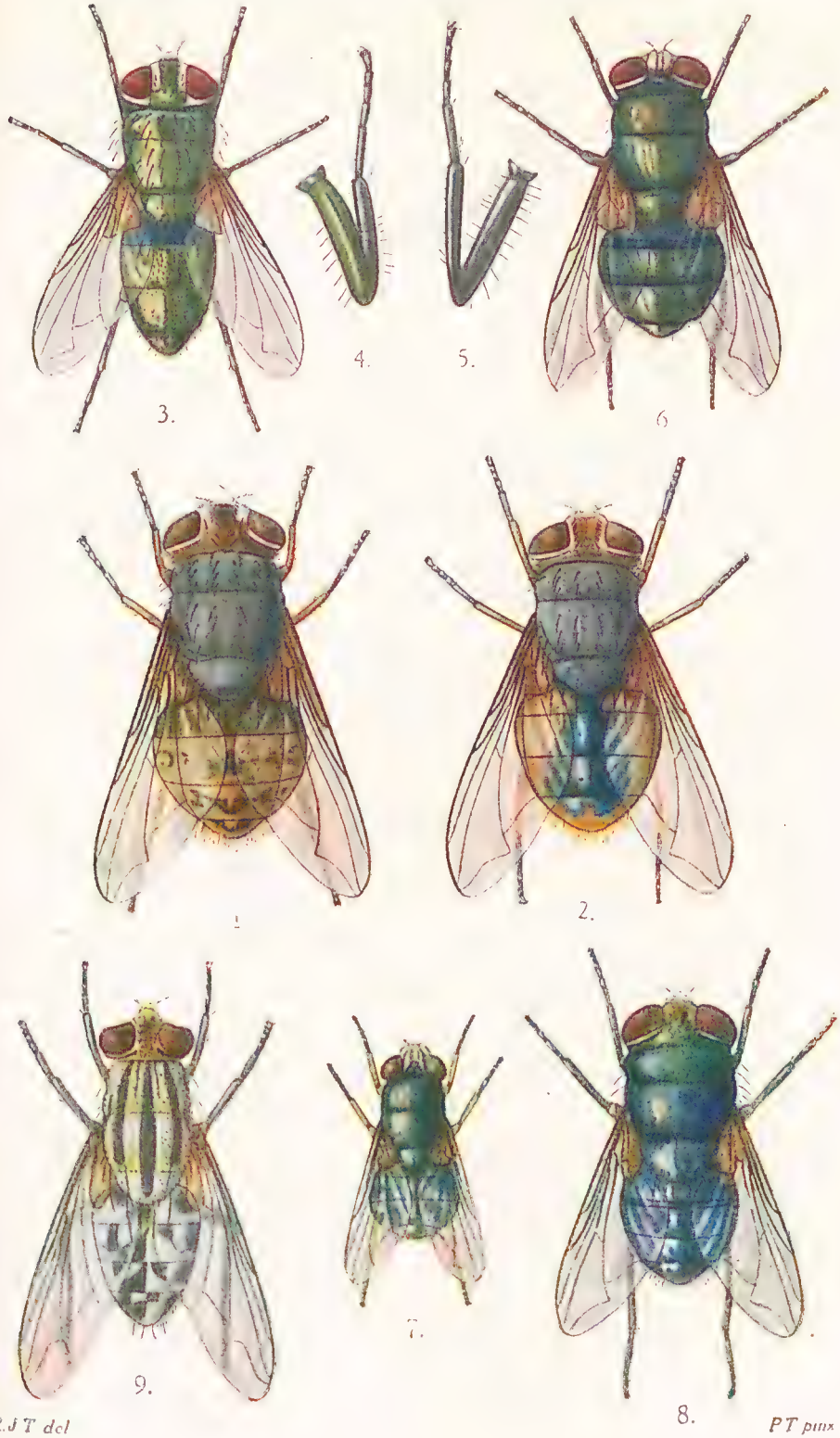
Victoria's Gift Onion Seed

Scotland's Appreciation

VICTORIAN home gardeners who contributed to the six tons of onion seed sent as a gift to the home gardeners of Britain will be pleased to learn that excellent crops resulted from its use.

The Minister of Agriculture, Mr. Norman Martin, has received through the Agent-General for Victoria a letter from the Scottish Gardeners and Allotments Committee, which early this year received a consignment of Australian Brown Onion Seed grown and donated by householders, growers, nurserymen, and others in Victoria under a scheme sponsored by the Department of Agriculture.

This seed was distributed to a lotment holders in Scotland from whom many letters of thanks and appreciation have been received. "More recently" writes the Secretary of the Allotments Committee, "letters have reached me expressing complete satisfaction with the results obtained. Everyone, without exception, speaks highly of the quality of the seed and of the crops grown from it May I therefore convey to you Scotland's most cord al thanks for this generous gift. The fact that our Australian friends, no ess than ourselves, are experiencing the trials of war, adds still further to its value in our eyes. I can assure you that the seed has been used to excellent purpose, that it germinated well and that it has assisted us materially in our efforts to stock the national larder."



1.—Large Brown Blowfly (*Calliphora stygia*). 2.—Lesser Brown Blowfly (*Calliphora augur*). 3.—Primary Green Blowfly (*Lucilia cuprina*). 4.—Foreleg of *Lucilia cuprina*, showing green thigh or femur. 5.—Foreleg of European Green Blowfly (*Lucilia sericata*), showing black thigh or femur. 6.—Secondary Green Blowfly (*Chrysomyia rufifacies*). 7.—Small Green Blowfly (*Microcalliphora varipes*). 8.—Steel Blue Blowfly (*Chrysomyia micropogon*). 9.—Australian Striped Blowfly (*Sarcophaga froggatti*).

NOTE.—All figures of flies four times natural size. Figures 4 and 5, eight times natural size.

13305/43.

THE SHEEP BLOWFLY *and* ITS CONTROL

Contributed by THE VETERINARY STAFF

Although a great amount of research work dealing with the control of the sheep blowfly has been carried out over the past number of years, and much publicity given the problem, serious losses are still being inflicted upon the sheep and wool industry by this pest. Sheep-owners and others interested in the sheep industry, directly or indirectly, should do everything in their power to help combat this very serious menace both to the industry and to the national income.

NO single method of controlling the pest has been found, and it is necessary, therefore, to practice a combination of various preventive and curative measures.

Life History and Varieties of Blowflies

The blowflies concerned with strike in sheep in Australia are shown in the accompanying coloured plate, and are classed as follows :—

Primary flies, which actually start the strike.

Primary Green Blowfly (*Lucilia cuprina*) causes at least 80 per cent of strikes in Australia. It is a slender egg-laying fly, and coppery to yellow-green in colour. It is seldom found in the house. This fly is most active at temperatures between 70° and 80° F., and for this reason two main fly waves occur in each year, in spring and in autumn.

Large Brown Blowfly (*Calliphora stygia*)—commonly found in houses, has a brown body and lays eggs ; it is often numerous in cool weather.

Lesser Brown Blowfly (*Calliphora augur*)—often causes strike in tailing wounds, and is a great nuisance in the house. It has a blue band down the body and lays living maggots. It is smaller than the large brown blowfly.

Secondary flies, which attack and develop only in a strike already started by primary flies.

Secondary Green Blowfly (*Chrysomia rufifacies*—bluish-green in colour, especially when alive, and much squatter than the Primary Green Blowfly (see above). Transverse lines can be seen running across its body and thorax. It is seldom found in the house, and breeds in decomposing meat, whereas the primary fly prefers fresh meat. Its eggs develop into hairy maggots whereas the maggots of the primary fly are smooth.

Small Green Blowfly (*Microcalliphora varipes*).

Steel Blue Blowfly (*Chrysomia micropogon*).

Australian Striped Blowfly (*Sarcophaga froggatti*).

The three varieties abovementioned are secondary flies of lesser importance.

Although all blowflies go through the same stages during their life cycle, the time required for completion of the cycle varies in different species. Seasonal conditions may also affect the length of the life cycle in any one species.

The typical life cycle of the blowfly is as follows :—

The adult female fly of most species lays eggs, though a few species deposit living maggots. In the case of those which lay eggs, a maggot or larva, hatches from each egg, the time of hatching varying from a few minutes to 24 hours. The maggot is very active, and moves about freely to feed. It feeds for two to four days, and when fully fed, leaves its feeding ground and wanders about until it finds a suitable place to pupate, which is usually in the surface layers of the soil. The pupal stage lasts about eight days, when the adult fly emerges from the soil, thus completing the cycle.

Each female fly is capable of laying eggs when three days old, and lives for about a month. It has been found that each female blowfly is capable of laying up to 3,000 eggs during its lifetime.

The primary flies breed mainly on the living sheep. They do not breed in carcasses, although a fresh carcass will at first attract only primary flies, and for the first one or two days only primary (smooth) maggots will be found in the carcass. Then, as the carcass starts to decompose, the secondary flies are attracted in turn, and secondary (hairy) maggots soon hatch out. As the secondary maggots are more active and grow more rapidly than the primary maggots, they push the primary maggots out of the feeding grounds before they have fed sufficiently. In addition they actually destroy a number of the primary maggots. The result of these activities of the secondary maggots is that very few primary maggots are able to obtain from carcasses the amount of food necessary for them to complete their development.

How Strike Starts

The primary fly is attracted by the presence of moist and somewhat inflamed or injured tissue on the skin of the sheep. Though obvious injuries such as shearing and marking wounds and abrasions on the heads of rams after fighting may serve to attract the fly, these wounds usually dry in a short time. Most of the strike in sheep results from "scalding" or inflammation of the skin set up by moisture. Experiments have shown that continuous wetting of the fleece of a sheep with water has led to strike in two to eight days. Strike will become established on a moist surface only, because the eggs cannot hatch, nor can the young maggots survive without moisture.

In the field, most of this scalding occurs in the crutch region of the ewe and is due to wetting of the wool with urine, and to a lesser extent, to soiling of the wool with dung. If the wool does not dry out fairly rapidly, scalding results and the fly is attracted to lay its eggs in the crutch.

The Effects of Strike

When the maggots have hatched, they work their way through the wool to the skin, which they attack, inducing intense irritation and causing the sheep to bite at the affected part. This will attract attention to the animal, which may separate itself from the flock, cease feeding, and show general uneasiness; when struck in the crutch it will probably stamp with either hind foot, and wriggle its tail. The wool on the affected area becomes stained, and if bitten by the sheep will be ragged. As the maggots grow they attack the surrounding tissues, and the infestation spreads outwards from the first point attacked. The wool comes away, leaving a raw surface, and the sheep gradually loses condition; gangrene of the affected area sets in, and may be followed by death.

Predisposing Causes of Strike

After consideration of the sequence of events which lead to strike in sheep, it is obvious that certain features of the sheep play an important part in providing the conditions necessary to attract the fly. In the crutch region of the ewe, wrinkles may carry the wool in such a position that it is likely to be continually moistened with urine, and this also may occur more readily in sheep with close hocks or with any abnormality of the vulva. The length of tail is important also as sheep with very long or very short tails have been found to be more susceptible to strike. In wet weather, moisture can collect in the hollow of the withers in sheep with bad wither conformation, and may also affect the skin along the back if the fleece is very open. The length and density of the wool also affect its rate of drying.

In addition to the factors mentioned climatic conditions influence the predisposition to strike. In warm humid weather, the activity of flies is increased and conditions favourable for strike are more likely to develop on the sheep.

CONTROL

Two ways by which the sheep blowfly problem may be attacked are prevention and treatment. Prevention must be the aim of every sheep-owner; the more effective the preventive measures, the less will be the need for treatment. Methods of prevention of strike follow two main lines—decreasing the susceptibility of the sheep to the attack of the fly, and reducing the abundance of flies by killing the maggots or the flies, thus preventing the completion of the life cycle.

Methods of Reducing the Susceptibility of the Sheep

Various measures have been designed to reduce the susceptibility of the sheep. For convenience these will be discussed under the following headings:—

Breeding.—By careful selection for various faults, such as close hocks or bad conformation, the breeder can eliminate some of the more susceptible sheep from his flock. He may also breed away from those sheep showing

excessive wrinkling, especially of the crutch, as it is now recognized that the least susceptible sheep are those with a plain breech. Selection for absence of crutch wrinkles should be made after shearing or crutching, as the wool obscures the wrinkles. This is illustrated in Figure 1, which shows the same sheep before and after crutching.

As breeding out the wrinkles is a long term project, it may be necessary to give the sheep immediate protection from strike afforded by the Modified Mules Operation, which is described below.

Crutching and Shearing.—Both practices assist by reducing the length of wool, thereby allowing more rapid drying of the area from which the wool has been removed. Both shearing and crutching therefore play an important part in every scheme of blowfly control.

Jetting, Dipping, and Swabbing.—The aim in each case is to saturate the fleece with a solution poisonous to the maggots, so that a strike cannot become established.

In dipping, the whole fleece is saturated with the dipping fluid and the sheep is protected while the fluid remains in the fleece.

Jetting is the application of a solution to the crutch region of the sheep by means of a high pressure pump to which is attached a hose fitted with a fine nozzle. Various fluids can be used, the most effective being solutions of calcium or of sodium arsenite. Both can be prepared on the farm if so desired, and both are available commercially. Jetting equipment is considered too expensive for small flocks, and jetting is practised mainly in New South Wales and Queensland.

Swabbing is a means of applying a solution to the crutch by means of a small mop of rags fixed to the end of a stick. The solution may be poured on the sheep and spread with the mop, or the mop may be dipped in the solution and then thoroughly rubbed over the crutch. Mixtures commonly used are calcium or sodium arsenite, arsenical dips, or a mixture of bluestone and arsenic.

The Modified Mules Operation.—The original Mules operation consisted essentially of the removal of certain folds of wool-bearing skin from the crutch, and was not performed on plain-breeched sheep. In the Modified Mules Operation (described below) two strips of skin, one on each side, are removed from the buttocks

Fig. 1—The same sheep before and after crutching, illustrating the difficulty of selecting sheep "in the wool" for crutch wrinkles.

of every sheep in the flock. The amount of skin in these strips will vary with the looseness of the skin in the breech, but the strips are removed from the same site on every sheep *regardless of the size, length, and position of any folds actually seen on the sheep.* This latest recommendation is based on the results of trials which have shown that the best effect is obtained when the bare area or "shield" of skin round the vulva is stretched as much as possible. To obtain this result it is necessary that the "pattern" left on the sheep after removal of the two strips of skin should be the same *on every sheep.* The desired effect is brought about when healing draws the edges of the wounds together.

The aim of the operation therefore is to produce an artificial plain breech on the sheep. It must be clearly understood that the operation alone will not completely eliminate the danger of strike, and it is intended to be used in conjunction with other control measures, such as crutching, correct length of tail, and destruction of maggots on struck sheep.

Sheep to be Treated.—The decision as to whether a flock should be treated must be made on economic grounds. The importance of strike on the property, including losses of sheep and wool, fall of condition of struck sheep, and the time and labour involved must be considered. The owner should then be in a position to decide whether the relatively small cost of treating the flock will be justified by the greatly increased protection from strike which is conferred on treated sheep. That the degree of protection is high can no longer be doubted from the results obtained in field trials by the Council for Scientific and Industrial Research, and from the reports received from private properties.

Fig. 2—The completed operation.

When it has been decided to protect a flock by this means, it is recommended that *all* sheep in the flock should be treated, as it has been found that even naturally plain-breeched sheep are rendered less susceptible to strike by the operation.

The operation is performed mainly on Merino sheep, but the same protection can be given to any sheep regardless of breed if trouble from crutch strike is commonly experienced on the property.

The Age for Treatment.—The operation can be performed on sheep of any age though it is obvious that the younger the age at which a sheep is treated, the longer will be the period of protection.

Though lambs can be treated at marking, the operation is slightly more difficult than in older sheep, as the area of the crutch is small, and in lambs over three weeks of age the length of wool may hinder the operator.

All sheep other than lambs must be treated within a fortnight after crutching or shearing, otherwise it is impossible to perform the operation properly. In crutching before the operation, the wool should be removed well up over the butt of the tail.

Weaner age is usually found convenient, as weaners are easy to handle, and it is suggested that learners should start on weaners rather than on lambs. The heavy handling involved in treating adult sheep should not deter owners from treating at least the susceptible ewes which show urine stained breeches.

Holding the Sheep.—The sheep is held on a rail in the same position for lamb marking, except that the hocks are not pulled towards the holder so tightly, as the skin of the breech must be as slack as possible.

Instruments.—The most satisfactory instrument for the operation is a clean pair of dagging shears. Shears with 6-inch blades are the most convenient size, and they must be well sharpened right to the heel of the blades.

Precautions.—The hygienic precautions observed for lamb marking also apply to this operation. The shears must be kept clean, and should be dipped in a solution of a suitable antiseptic, such as lysol, after treating each sheep. Temporary yards should be used where possible, and the sheep should be dropped on to clean pasture.

The Operation.—The pattern left after the removal of the two strips of skin is shown in Figure 2. This photograph shows that each wound is crescent-shaped, having its widest part level with the vulva, and tapering to a point at each end. One end is just above and to the side of the butt of the tail, and the other end is on the inside of the leg near the top of the hamstring.

This is the pattern to be aimed at in every sheep and it is important that the inner edges of the wounds should be only 1 to 2 inches apart at a point 1 to 2 inches below the tip of the vulva, depending on the size of the sheep. The widest part of the wound, level with the vulva, should be 2 to 2½ inches in width.

Fig. 3—Showing method of holding the shears and picking up the skin. The cut has just been started.

To start the cut, the shears are held so that the back of the hand faces the sheep and the blades should be flat against the buttock. The skin is held up between the thumb and forefinger of the left hand, in such a manner that the palm of the left hand does not hide the field of the operation (Figure 3). The cut is started with the blades wide open and as the cut extends the handles of the shears are raised so as to keep the blades flat against the sheep, while the points of the blades gather the skin to be cut.

The cut should be as close as possible to the bare skin round the vulva, but care must be taken to leave the bare area intact. The cut is continued somewhat inwards to a point 1 or 2 inches below the tip of the vulva, then turns slightly outwards and is tapered to a point on the inside of the leg near the top of the hamstring. To complete the operation a corresponding cut is then made on the opposite side.

Inexperienced operators often start the turn outwards too soon, with the result that the wounds are not close enough below the vulva. If the operation has been correctly performed, the width of skin between the two wounds below the vulva is never more than 2 inches in adult sheep, and less in smaller sheep.

When the skin of the breech is very loose, it is necessary to include more skin in the strip removed so as to give the finished wounds the necessary width. To achieve this result, the skin is pulled further through the shears with the left hand, and the blades are pressed harder against the sheep.

Healing.—The wounds are usually dry after 24 hours. The edges of the wound start to come together in two to three days, and healing is usually complete in about three weeks. It is not necessary to apply any dressing, as there is little possibility of strike occurring in fresh wounds. It is, however, not advisable to perform the operation at times when fly waves usually occur.

Rate of Operating.—The operation requires care and skill, and these qualities must not be sacrificed in order to attain greater speed. A beginner will soon form an estimate of the rate at which he can treat the sheep, and he will find that his speed increases with his experience, as in learning to shear.

An experienced and efficient operator may attain a rate of about 200 to 250 sheep per hour, when working with three or four catchers. If

the operation is to be performed on lambs at marking time, one experienced operator will almost keep pace with one marker, as the operator will be treating the ewe lambs only. Operating on lambs however, requires more skill than treating larger sheep.

Tail Length for the Prevention of Crutch and Tail Strike.—Recent experiments and field observations have shown that a docked tail somewhat longer than that commonly adopted in practice gives greater protection against crutch strike and tail strike. By adopting the correct length of tail at docking, this protection can be given to *every* sheep irrespective of breed and type.

The length of tail which gives the greatest protection is that which allows the tail to extend to about half an inch below the tip of the vulva. In docking, therefore, the tail of the lamb should be held against the crutch and the knife edge placed at the correct point about ¼ to ½ inch below the tip of the vulva. This is shown in Figure 6, and the correct length of tail, in an adult ewe is shown in Figure 7. With experience the operator can adopt his own method of obtaining the correct length.

Methods of Reducing Fly Population

In a consideration of methods of reducing the blowfly population, it must be remembered that only primary flies can start a strike. This means that unless the population of *primary* flies is reduced, there will be no reduction in the number of strikes. It is for this reason that methods of destruction of flies and their breeding grounds must be directed against the primary fly.

Destruction of maggots on the "struck" sheep—The "struck" sheep is by far the most important breeding ground of primary flies. Almost every fully fed maggot which drops off the sheep after the fourth day will pupate in the soil, and become an adult primary fly, able to start another strike. For this reason it is essential that every struck sheep should be treated within three days of the start of the strike if possible, and that *every maggot on the sheep should be destroyed.*

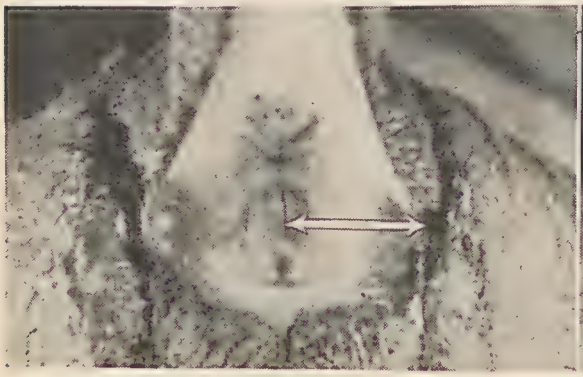
To ensure the complete destruction of the maggots, a definite procedure should be followed when treating a struck sheep. This procedure is fully described under the heading "Treatment of Struck Sheep".

Trapping and carcass destruction.—These measures are now considered to be of little importance in blowfly control, following upon the recognition that the primary fly maintains its population on the living sheep, rather than in decomposing carcasses.

Traps involve considerable labour, as the bait must be kept fresh (not older than three days) to attract primary flies, and at least one trap must be used to every 25 acres to obtain a significant reduction in the primary fly population. Even with fresh baits primary flies usually form only one to five per cent. of the catch, the remainder being secondary flies.

Carcass destruction has a very limited value in blowfly control, though it is a necessary sanitary measure, and is essential in the control of certain diseases.

As indicated earlier, very few primary maggots obtain sufficient food from a carcass to complete their development, and those which do become fully fed will leave the carcass after about three days to pupate. From these facts it can be seen that the development of only a few primary flies is prevented by destroying a carcass within three days of death, and that it is a waste of time to



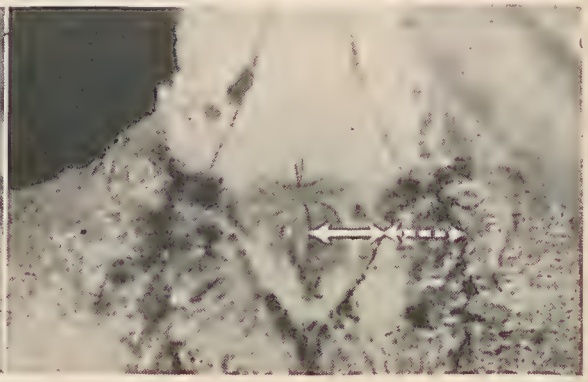


Fig. 4 (Left)—The result of the correct operation. The cuts have been made close to the bare area and brought close to each other below it. Note correct stretching as shown by arrows. Fig. 5 (Right)—Result of an incorrect operation. The cuts have been made too far from the bare area and not close enough below it. Compare the correct stretching of the bare skin in Fig. 4, as indicated by the arrows.

destroy a carcass more than three days old, as only secondary maggots will be present.

Burning is the most effective method of destruction of carcasses. Burial is unsatisfactory unless the carcass is first poisoned, as the blowflies which develop from the buried maggots can make their way to the surface through four feet of loose soil.

Poisoning of carcasses is carried out with borax or arsenical sheep dip, the powder being mixed with an equal quantity of sand or soil, and applied by shaking from a tin with holes punched in the lid. Both sides of the carcass should be dusted thoroughly, particularly the mouth and all other openings where flies congregate to lay their eggs. This method kills adult flies as well as maggots, and if applied in time, discriminates against the primary flies, as it prevents them from breeding while the carcass is fresh. Later, if the poison is washed off by rain or the carcass collapses, maggots of the secondary flies will quickly take possession and render it an unfavourable breeding ground for primary flies.

Fig. 6—Measuring the tail of a lamb against the crutch. The blade of the knife is placed against the tail at the correct point.

Fig. 7—The correct length of tail as seen on an adult ewe.

Treatment of Struck Sheep

Treatment of the sheep should be undertaken with two objectives in mind—first, the treatment of the sheep itself, including the removal of all maggots, and secondly, the *collection and destruction of all the maggots and wool removed, as most of the maggots will be those of primary flies, each capable of developing into an adult striking fly.*

During the fly season frequent inspections of the flock should be made so that cases may be detected as soon as possible and treated immediately, as primary maggots which have fed for only two days are capable of developing if they fall off the sheep, and after four days maggots will be continually dropping off the sheep to pupate in the ground. As it is difficult to detect small strikes in the field, it is preferable to yard the sheep for inspection, particularly when the flies are prevalent. In large paddocks convenient yards can be erected for this purpose.

When a strike is located, a suitable dressing should be applied to the wool around the margin of the struck area first so as to prevent the maggots from escaping into the clean wool, and then applied to the whole area so that all maggots may be destroyed. The wool over the struck area should then be removed with shears, including

a margin of clean wool surrounding the area. Some provision should be made for the collection of all wool and maggots removed from the sheep, so that they may be destroyed. For this purpose, sheep may be cleaned either on a canvas sheet on which all maggots and wool can be collected for destruction, or on a wooden grating through which the maggots will fall into a receptacle, or a concrete pit in which they can be poisoned.

Where maggots have penetrated the flesh, a thorough search of the "struck" area should be made to locate and remove as many maggots as possible. Scabs should be regarded with suspicion, as maggots are often found beneath them. All wounds, and "pockets" under the skin, should be opened up to allow the dressing to gain access to the maggots and also to permit free drainage of all discharges; if necessary a syringe can be used to force the dressing into the depths of the wounds.

After treatment, affected sheep may be drafted off and placed in a small paddock where they can be kept under close observation. As a rule one dressing will be found effective, but if the animal has been badly "struck" it should be yarded each day and dressed until recovery is complete.

Dressings of many kinds have been used to treat struck areas on the sheep, but though most of them kill the maggots, many of them are very harmful to the already damaged tissues of the sheep.

Of the many types of dressings tested, those containing boric (boracic) acid have given most satisfactory results, as boric acid readily destroys maggots, but does not injure the tissues of the sheep, and is not harmful if it is absorbed.

The following dressing known as B.T.B. 15, which is recommended by the Council for Scientific and Industrial Research, contains a high proportion of boric acid, and has proved very satisfactory under field conditions. It can be obtained commercially under various trade names, or can be prepared on the property.

Preparation of B.T.B. 15.

To make two gallons of B.T.B. 15, the following ingredients are required:—

Boric acid (powdered) ..	3 lb.
Bentonite	$9\frac{1}{2}$ oz.
Agral 2	$1\frac{1}{2}$ oz.
Mixture of equal parts, Kerosene and creosote ..	7 fl. oz.
Water	$12\frac{3}{4}$ pint.

Mix together the boric acid and bentonite, and stir in the Agral 2. Of the total quantity of water required, stir into the powder sufficient to make a smooth thin paste. Add the 7 fl. oz. of the kerosene-creosote mixture, and stir it thoroughly into the paste. Finally add the rest of the water slowly, with constant stirring.

Certain points should be noted with regard to the ingredients used:—

Boric acid ..	Should be finely powdered.
Bentonite ..	Only processed bentonites of American origin should be used.
Agral 2. ..	A wetting agent assisting the mixing of the dressing and its penetration of the wool.
Kerosene ..	Lighting or power kerosene is satisfactory.
Creosote ..	Should have a distillation range of approximately 240–330°C.
Water ..	Hard water is unsuitable; tank or other soft water should be used.

[The blocks for the coloured plate accompanying this article were kindly supplied by the Council for Scientific and Industrial Research.

The Agricultural Lime Act

Brands Registered for 1944

By W. C. ROBERTSON, Chemist

LEGALLY agricultural lime is calcium oxide (lime), calcium hydrate (slaked lime) or calcium carbonate (limestone or chalk) or any one or more of these substances sold or intended to be used for application to the soil. *It does not include any fertilizer within the meaning of the Fertilizers Act.*

A country lime quarry

The most stable form of agricultural lime is the carbonate (ground limestone or chalk), which is sometimes called "mild or natural" lime. When limestone is burnt in a suitable kiln at a comparatively high temperature, the oxide form is produced; this is commonly termed "lime", "burnt lime", "fat lime", "caustic lime", "builders lime", "stone lime", &c. This chemical compound is most unstable and on exposure to the air quickly absorbs water to become calcium hydrate or slaked lime, which in turn readily combines with the carbonic acid of the atmosphere to form calcium carbonate (limestone or chalk) the original natural substance.

In the face of these facts the question is often asked "Why burn the limestone if it so readily reverts to the original condition?" The answer is that limestone is not burnt with the object of producing agricultural lime, but for the production of high grade industrial or chemical lime (oxide or hydrate), the latter being the product of treating the burnt lime with steam or water under strict control. In the course of burning the limestone, however, there is always the possibility of a "bad burn" or some defect which produces "seconds" or a lime of somewhat inferior quality which is unsuitable for industrial purposes. Or perhaps, as in the case of smaller lime works, an amount of burnt lime accumulates over a period and becomes air-slaked. In both cases, the mixture of oxide, hydrate and carbonate becomes available as agricultural lime. In the former case the oxide form will predominate, while in the latter the main form will be the hydrate (slaked). Should exposure be prolonged the burnt lime would be wholly carbonated and become agricultural lime in the shape of white powder, i.e., chalk. Whereas burnt or builders lime may be sold or used as agricultural lime if the farmer can be persuaded to pay the price, agricultural lime cannot be used as builders lime or for industrial purposes. It is simply a matter of quality.

For the current season four brands of agricultural ground burnt lime are registered with an average analysis of 82.9 per cent. of lime (which for the purposes of this article means calcium oxide) and 3.2 per cent. magnesia (magnesium oxide). The average degree of fineness is 66 per cent. passing through a sieve of twenty meshes to the linear inch. The average price per ton is £3 4s. which gives an average unit price of approximately ninepence farthing for each 1 per cent. of lime per ton in agricultural ground burnt lime.

Five brands of agricultural slaked lime with the bulk of the lime present in the form of the hydrate have been registered, having an average analysis of 57.7 per cent. of lime and

2.1 per cent of magnesia. The amount which passes through a twenty mesh sieve is guaranteed to average 73.8 per cent. and the average price is £2 4s. 10d. per ton which gives the unit value of approximately ninepence farthing for 1 per cent. of lime per ton in agricultural slaked lime.

Five brands of ground limestone having an average analysis of 48.3 per cent. lime and 1.8 per cent. magnesia also appear in the list. The average amount passing through a twenty mesh sieve is guaranteed to be 81 per cent. The average price per ton is £1 7s. 10d. and the average unit value is just under sevenpence.

It will be noted that ground limestone or chalk is the cheapest form of lime and agricultural ground burnt lime and agricultural slaked lime the dearest at approximately the same price per 1 per cent. lime per ton.

In conclusion and generally speaking burnt lime either as ground burnt or as slaked should be purchased for use in intense culture (particularly in home gardens) and on arable land, and any of the three forms on pasture with a preference for the burnt or slaked forms when the land to be limed is of a heavy nature. Whereas agricultural liming is often of paramount importance to the farmer or grazier it is not to be assumed that it will act as a fertiliser or that it will take the place of fertilisers. On the other hand, it is particularly effective if used judiciously with superphosphate and nitrogenous fertilisers.

LIST OF AGRICULTURAL LIMES REGISTERED AT THE OFFICE OF THE DIRECTOR OF AGRICULTURE UNDER THE AGRICULTURAL LIME ACT 1934 (No. 4271) FOR THE YEAR 1944.

General Description.	Brand.	Calcium Oxide.	In the Form of—	Equivalent to Calcium Carbonate.	Magnesium Oxide.	In the Form of—	Degree of Fineness. Material Passing Through a 20-mesh Sieve.	Price per Ton in 11-ton Lots.	Manufacturer.
		%		%	%		%	£ s. d.	
Agricultural Ground Burnt (unslaked)	Lilydale, No. 1	87·70	Mainly oxide	156·90	5·00	Mainly oxide	65·00	3 8 0	David Mitchell Estate, Oliver's-lane, Melbourne, C.1
,, ,, ,,	,, No. 2	80·00	,,	143·00	5·00	,,	60·00	2 18 0	David Mitchell Estate, Oliver's-lane, Melbourne, C.1
,, ,, ,,	Kurdeez ..	80·00	,,	142·85	1·52	,,	55·00	3 0 0	Victorian Agricultural Lime Ltd., 422 Collins-street, Melbourne, C.1
,, ,, ,,	Kawa Oxide ..	83·80	,,	149·70	1·20	,,	84·00	3 10 0	P. Alkemade and Sons, 535 Little Lonsdale-street, Melbourne
Agricultural Slaked Lime	Lilydale ..	60·00	Hydroxide and carbonate	107·23	3·00	Mainly hyurate	72·00	2 5 0	David Mitchell Estate, Oliver's-lane, Melbourne, C.1
,, ,, ,,	Cave Hill ..	50·00	,,	89·50	5·00	,,	72·00	1 13 0	David Mitchell Estate, Oliver's-lane, Melbourne, C.1
,, ,, ,,	White Rock ..	60·00	,,	107·00	2·00	,,	70·00	2 0 0	White Rock Lime Co. Pty. Ltd., 20 Queen-street, Melbourne
,, ,,	Snowflake ..	60·00	,,	107·10	1·80	,,	75·00	2 5 0	Evans Bros. Pty. Ltd., Yarra Bank-road, South Melbourne
,, ,, ,,	Bulldog ..	51·80	,,	92·40	·80	,,	60·00	2 5 0	Bulldog Lime Co. Pty. Ltd., 344 Swan-street, Richmond, E.1
,, ,, ,,	Kawa ..	66·70	,,	119·10	1·20	,,	93·00	3 1 6	P. Alkemade and Sons, 535 Little Lonsdale-street, Melbourne
Ground Limestone	Lilydale ..	50·00	Carbonate	89·50	3·00	Carbonate	95·00	1 6 10	David Mitchell Estate, Oliver's-lane, Melbourne, C.1
,, ,, ,,	Walker's ..	44·80	,,	80·00	2·00	,,	75·00	1 5 0	David Walker, Waverley Lime Works, Lara
,, ,, ,,	Lara ..	45·00	,,	80·00	1·50	,,	80·00	1 10 0	Lara Fertilizer and Lime Co., Lara
,, ,, ,,	Kurdeez No. 1	50·40	,,	90·00	1·50	,,	80·00	1 5 0	Victorian Agricultural Lime Ltd., 422 Collins-street, Melbourne
,, ,, ,,	Kawa ..	51·40	,,	91·70	1·20	,,	75·00	1 12 6	P. Alkemade and Son, 535 Little Lonsdale-street, Melbourne

Melbourne, 2nd December, 1943.

W. R. JEWELL, M.Sc.,
Chemist for Agriculture.

"Scabby Mouth" *in* Sheep and Lambs

(Contagious Pustular Dermatitis)

By L. P. PREWETT, B.V.Sc., Veterinary Officer

"SCABBY MOUTH" is an apt name for the infectious disease *Contagious pustular dermatitis*, which affects sheep, lambs, and also goats. It begins as a reddening and weeping of the skin most commonly in the region of the muzzle, and progresses until the skin is swollen and ulcerated and covered with thick hard scabs. There is discomfort and interference with drinking and eating, the growth of affected lambs is checked and death may occur. Infection of the coronet of the foot may occur also with the development of similar lesions so that walking becomes difficult.

In America, the disease was formerly known as "lip and leg" disease.

"Scabby mouth," showing lip lesions on ewe.

Outbreaks of "scabby mouth," occur from time to time in flocks, affecting many of the lambs—up to 90 per cent. at times—and a few of the older sheep. Severe outbreaks may occur in adult sheep which have escaped infection during their youth, and, therefore, have not acquired an immunity to the disease.

Cause

The cause of "scabby mouth" is a virus somewhat similar to that causing cow pox. A virus is a living organism so small that it will pass through filters fine enough to stop ordinary bacteria. It is too small to be seen under a microscope. The "scabby mouth" virus will persist in the scabs for several years, being very resistant to weather conditions, and may live on the ground for a long period.

The source of infection may be dried scabs from animals affected in previous years, or pasture recently contaminated by infected sheep. Some slight injury to the skin will assist the entry of the virus into the skin. This accounts for the greater prevalence of the disease when sheep are on rough dry feed, and when grass seeds and burrs are troublesome.

Symptoms

Lesions are most commonly seen on the skin of the lips and muzzle of lambs. They may extend around the nostrils and eyes and even on to the mucous membrane lining the mouth. The feet may become affected at the region of the coronet. Milking ewes may develop udder lesions following infection, due to the butting of their infected lambs. In one outbreak rams became affected on the scrotum.

After an incubation period of about two days, the first sign of developing "scabby mouth" is a reddening of the skin, followed by an exudation of fluid, which at first is clear, but soon becomes yellowish and of the nature of pus. Blister-like vesicles which tend to form are burst, and the exudate and pus dries into a thick hard scab. The underlying tissues become swollen and ulcerated, while overgrowth of the skin may give a warty appearance, but this disappears as the animal recovers. In about three weeks after infection the scab falls off, leaving very little scarring of the skin. The

recovery from the disease is due to the development by the affected animal of a strong and lasting immunity to the virus. Because of this, several methods of vaccinating with the virus have been used in other countries as a preventive, with varying degrees of success.

"Scabby mouth" infection may be complicated by blowfly strike, or subsequent infection with other invading bacteria, causing more severe lesions.

Control and Treatment

If affected lambs and sheep are drafted out from the flock and isolated for treatment, the effects of an outbreak may be mitigated. Treatment aims at reducing the time and degree of disability while the disease runs its course. Mild antiseptic solutions and antiseptic fatty and oily dressings are very satisfactory for application to the affected areas of skin. The parts should be swabbed or dipped in either a 1 per cent. solution of lysol (1 tablespoonful to 2½ pints of water) or a 5 per cent. solution of copper sulphate (1 oz. to 1 pint of water.) After the scab has been softened and removed, apply an ointment made up of the following:—

Cresol or lysol	5 parts.
Sulphur	10 parts.
Lard, vaseline, or tallow ..	100 parts.

Treatment should be repeated every second day until the animals recover.

In severe cases where the removal of the scabs reveals deep ulcers discharging a foul-smelling pus, the inflamed surfaces should be painted with tincture of iodine, and afterwards dusted with a powder made of one part of chloride of lime to two parts of boric acid.

"Scabby mouth" showing lesions.

Lesions on coronet of lamb.

JOIN OR FORM A WAR SAVINGS CERTIFICATE GROUP

War Agricultural Committee Notes

Compiled by THE CENTRAL EXECUTIVE

The importance of Food Production as one of Australia's major contributions to the Allied War Effort has been stressed frequently in many different ways during the past few months. The part played by Victorian farmers has been a credit to them, especially in view of the difficulties under which they are working. But good as this effort has been, farmers are still being impressed with the need for greater food production and urged to direct their labours into forms of production which are required most urgently. The response to appeals to expand production of crops which were grown only to a limited extent before the war, but which are now required in large quantities, has been very gratifying. Old crops like flax, vegetables and potatoes, have been considerably extended, while new crops now being grown include navy beans, blue peas and mustard.

A RESUMÉ of the production of the main agricultural commodities during the past financial year, as compared with that during the 1941-42 and the targets set for the current year, forms a suitable basis on which Victoria's contribution to the drive for increased production can be estimated. This comparison is shown in the table on page 22.

Dairy Products

During 1942-43 total dairy factory production in Victoria decreased by approximately 9 per cent. compared with the previous year. To meet the increased demands of the Services and the British Ministry of Food for powdered milk and cheese, the production of these commodities was increased at the expense of butter. Though the production of condensed milk decreased approximately 11 per cent. below that for the previous year, every endeavour was made to process as much milk as possible, and actual production exceeded the goal set.

The Commonwealth authorities have asked for a substantial increase in dairy production during the current year. Unfortunately, there has been a decline of approximately 16 per cent. in total dairy production during the first three months of the year, due largely to adverse seasonal conditions. If the amount required is to be produced, every effort will have to be made to increase the production of individual animals by extending the lactation period as long as possible, and by better supplementary feeding during the rest of this season. A considerable help in this direction will be the expanded flour milling programme which will make available larger quantities of bran and pollard. However, much will depend on the number of rural workers released from the Army and protected industries.

Meats

The production of meats other than pig meats was very satisfactory last year, there being an increase of 4 per cent. in beef and veal, and 5 per cent. in mutton and lamb compared with the previous year. On the other hand, pig meat production decreased by 25 per cent., due mainly to the fact that pig raising, being in most cases but a side-line, was the first to be curtailed when labour and other difficulties were encountered.

It is expected that during the current year beef production will not be as great as during 1942-43, because of the decreased carrying capacity of the pastures caused by the shortage of superphosphate, and the anticipated stabilization of the dairying industry which will result in a considerably smaller number of cows being slaughtered. Mutton and lamb production should be maintained. The production of lamb during the first three months of this current year shows a decrease of 42 per cent. compared with 1942-43, as a result of the drought conditions prevailing in the northern portion of the State and the lateness of marketing of the lambs. The production of mutton, however, has increased during the same period by 11 per cent.

Victoria is not expected to increase production of beef, veal, mutton, or lamb, but an increase of 25 per cent. in the production of pig meats is desired, and, despite the drop in the number of pigs slaughtered during the first quarter of this year, it is expected that this increase will be attained mainly as a result of the increased weight of animals slaughtered.

Eggs

Although there was a slight decrease in the production of eggs in 1942-43 compared with the previous year, production from February to June was insufficient to meet requirements, and retailers were forced to ration civilian customers.

During the current year an increase of 23 per cent. is required to meet increased demands, and already production for the first three months of this period shows an increase of 15 per cent. compared with that for last year.

Potatoes

Contracts let for potatoes during last year totalled approximately 55,000 acres, but actually only 51,500 acres were sown. Nevertheless, this area represented an increase of 63 per cent. over the area planted during 1941-42.

A further increase of 25 per cent. in the area planted to potatoes is required this year. Already contracts have been let in excess of 75,000 acres.

Other Crops

The area planted to flax during 1942-43 was 2 per cent. greater than in the previous year, and a further increase of 23 per cent. was aimed at this season. Although the area planted has not quite reached the required figure, it shows an increase of 22 per cent. over that sown in 1942.

The production of dried vine fruits last year was 4 per cent. below that of the previous year, and every endeavour is being made this year to pack as much fruit as possible. The target aimed at is an increase of 5 per cent. over last year.

The position is much the same with canned fruits, for which no target has been set, though everything possible is being done to ensure that the maximum amount of fruit will be picked and processed this year.

From this brief survey, it will be seen that much has yet to be accomplished before Victoria can say that all requests have been fulfilled, and, therefore, the fullest use must be made of all available resources—man power, land, and machinery—so that the Allied Fighting Services and the civilian population of this country shall not want for food, and we will be able to ship substantial quantities to help maintain the short rations of the people of Britain.

Commodity.	Production 1941–42.	Production Target 1942–43.	Production 1942–43.	Production Target 1943–44.
DAIRY PRODUCTS—	Tons.	Tons.	Tons.	Tons.
Butter	61,500	60,800	54,700	55,000
Cheese	9,900	12,400	11,200	13,000
Dried Milk	10,500	13,200	11,200	15,300
Condensed Milk	34,700	22,400	30,900	37,200
		Mill. Galls.		Mill. Galls.
Whole Milk for consumption as such	..	54·0	..	54·0
Total (as Whole Milk)	..	426·4	..	408·4
MEATS—	Tons.	Tons.	Tons.	Tons.
Beef and Veal	113,000	107,000	118,000	108,000
Mutton and Lamb	152,000	150,000	160,000	160,000
Pig Meats	24,000	20,000	18,000	30,000
	Doz.	Doz.	Doz.	Doz.
EGGS	20,401,478	20,000,000	20,000,000	24,500,000
	Acres.	Acres.	Acres.	Acres.
POTATOES	33,400	55,000	51,540	64,000
FLAX	25,500	34,000	26,000	31,900
	Tons.	Tons.	Tons.	Tons.
DRIED VINE FRUITS	56,300	52,900	54,200	57,000
CANNED FRUITS—	Cases.	Cases.	Cases.	
Apricots	101,000	190,000	122,000	..
Peaches	970,000	1,152,000	825,000	..
Pears	533,000	624,000	590,000	..
			Bushels.	Bushels.
BLUE PEAS	..	Not Set	42,000	50,000
	lb.	lb.	lb.	lb.
TOBACCO	1,500,000	2,650,900	1,180,000	1,750,000

Artificial Fertilizers for 1944

Registrations and Unit Values

By W. C. ROBERTSON, Chemist

THE object of the Fertilizer Act of 1928 is to protect the man on the land. The Act permits departmental inspection of parcels of fertilizers in factory, store, or in transit, and samples may be withdrawn from any parcel of fertilizer for the purpose of checking up on quality.

During war, as in peace, the requirements of the Fertilizer Act have to be fulfilled. The most important provisions are:—

(*a*) The registration of a brand for any fertilizer intended for sale during the year.

(*b*) All parcels containing fertilizer to have a clearly printed label attached setting out the percentage composition of the fertilizer, and the number of net pounds in the parcel.

(*c*) An invoice certificate or warranty must be given to the purchaser by the seller at the time of sale or before delivery of the fertilizer. The figures on the label and invoice certificate guaranteeing composition must agree.

In ordinary times the main list of brands of fertilizers registered with the Department of Agriculture annually, together with the unit values of the various fertilizing constituents which are calculated from the composition and prices per ton of the simple fertilizers, were of greater import to the farmer than at present. The farmer could select several brands of the one class of fertilizer, and from the analyses by the use of the unit value system, calculate the value per ton, thus enabling him to buy to the best advantage. In this way it was sometimes possible for the user to save on his fertilizer bill.

Under existing conditions, however, the sale of fertilizers is controlled by a method of rationing, priority, and price-fixing to such an extent that, with manufacture and importation definitely limited, control under the Fertilizer Act, apart from checking quality, is largely superseded by National Security Regulations.

To-day every unit value is fixed before it is calculated. In the past the manufacturer or importer registered the fertilizer under the Act with analyses and prices of his own making, and on these figures the unit values were calculated.

At present the price per ton is fixed by the Prices Commissioner, and the composition in most cases depends on the raw material available.

The number of brands registered for 1944 (90) shows a decrease of 44 per cent. on the pre-war figure (160).

This is largely due to the exigencies of the times, but is of little moment, as the three main plant foods, nitrogen, phosphoric acid, and potash appear in the list under well-known brands.

Nitrogen

Nitrogen in readily available form as ammonia and nitrate, moderately available as blood and as bone, and slowly available as hoof, horn, leather, and vegetable meal, occupies a prominent place in the list.

Nitrogen in the form of nitrate is imported, while the ammoniacal, blood and bone nitrogen is derived from locally manufactured fertilizers.

Nitrogenous unit values are interesting—the most costly is the imported nitrate nitrogen (23s. 7d.), which includes the cost of transport from overseas. Nitrogen, as blood, and as bone (20s.) follow, and the cheapest nitrogen is that procurable in the form of sulphate of ammonia at 18s. for each 1 per cent. of nitrogen per ton of fertilizer.

It is questionable whether these unit values bear any relation to the agricultural value. However, with vegetable culture as a priority crop, and a general scarcity of nitrogen apart from nitrate, growers are fortunate to be able to receive supplies of this most costly fertilizing element in any quick-acting form.

Phosphoric Acid

Phosphoric Acid is still the most important plant food to the Australian farmer, and superphosphate remains the main source of supply. For security reasons the grade has been reduced to 18 per cent. with 14 per cent. water-soluble phosphate.

The price, as well as the quality, is under strict control, and therefore the unit values for the three forms of phosphoric acid may be regarded as "war values."

The phosphoric acid in bone dust and bone flour (the phosphate content of the latter is almost twice that of the former) is proving extremely useful in the present shortage.

In this connexion, and at present, bone is the only available source from which phosphoric acid can be derived in Victoria, and it was from bone that the first "super," under the name of "dissolved bones," was manufactured in the State.

Probably because of this fact, inquiries have been persistent recently as to the method of treating bones on the farm to make superphosphate.

The answer is that the plant required for this purpose would be altogether too costly to make the proposition worth consideration.

With the increased production of meatmeal for feeding purposes it is possible that there will be an appreciable decrease in the quantity of animal fertilizer and/or tankage (blood and bone) available as a nitrogen-phosphatic fertilizer. This may mean an increase in the quantity of bone available for manufacturing into bone dust, because of the necessity for making the grade of standardized meat and/or meat and bone meal. The more bone left in the feeding meal the lower the protein content, and therefore in cases where difficulty is experienced in making a good quality meatmeal some of the bone may be discarded.

Potash is available as sulphate and/or chloride (muriate), the latter being imported, while the sulphate—a small quantity of which is now manufactured as a by-product from the dust of cement kilns—is in strictly limited supply.

The unit values are high, the price per ton being fixed. Potash should not be used as such, but is extremely useful in intense culture, particularly when used in conjunction with nitrogen and phosphoric acid as in "complete" fertilizers.

The following notes for the treatment of carcasses and bones on the farm may be useful in the present emergency.

Treatment of Carcasses for Fertilizing Purposes

The fresh carcasses should be butchered into pieces of a size suitable for boiling in a receptacle large enough to hold the whole of the butchered meat, including bones, offal, &c. The offal should first be freed of undigested food. The fat could be collected for marketing as household fat or making into kitchen soap on the farm. The soup should be transferred to a portable tank, and distributed.

The residue, i.e., boiled meat and bones is roughly separated into meat and bone. The former is ploughed under along the rows of trees or vines, and the bones are treated as described in the next chapter.

Treatment of Bones for Fertilizing Purposes

Boil or digest the bones in a copper or other suitable receptacle.

Skim or float the fat off the surface. The tallow may be either sold or utilized for making soap.

Prepare a trench in good holding ground. The size of the trench will depend on the quantity of bones to be treated. In the bottom of the trench place a 6-inch layer of wood ashes (freshly burnt) or fresh unslaked lime. On top of this layer place a 3-inch layer of the digested bones.

Place wooden stakes (say 3 inches in diameter) upright at intervals of 3 ft. along the centre of the trench. Then repeat the layer of wood ashes (or lime) alternating with a layer of bones until the trench is filled to within 6 inches of the top. Finally cover with a 6-inch layer of wood ashes (or lime).

Remove the stakes gently and pour water (or liquid manure for preference) into the holes left by the stakes. Repeat the watering as often as necessary to keep the contents of the trench moist but not too wet.

After six months (possibly longer if the bones are bleached and dry) the bones will be found to have become soft and crumbly. When in this condition the contents of the trench are removed and roughly tamped to break them down. Any bones which have not responded to treatment and have not become soft are thrown aside for use in the next pitting.

The list of registered fertilizers will be found at the back of this Journal.

Live Stock Notes

Compiled by
A. C. T. HEWITT, M.Agr.Sc.,
Live Stock Science Officer

Avoid Accidents with Animals

ANIMALS account for a large number of farm accidents, many of them fatal. Kicks from horses and cows, and attacks by bulls, are the causes of many accidents. It should be remembered that a bull is safe only when behind a high strong fence. No bull should be trusted. He should always be led by a strong staff attached to a ring in the nose. Boars also must be watched carefully. Cows and sows when rearing their young may be dangerous also, and caution is necessary when handling them at this stage. Children should not be allowed to play with calves and sheep, as butts or kicks from the animals may be fatal or maim them for life. Although bulls are most feared of farm animals, kicks from horses are common, and every precaution should be taken with these animals. Before handling, always speak to the horse, and let it know that you are there, otherwise it may be startled and lash out in fear. Roosters, gobblers, and ganders should not be kept near the children's playing ground. No bird is worth the risk of the loss of an eye or the permanent disfigurement of a child.

The Bull.

The bull should always be handled cautiously, but this fact is not always appreciated, with the result that people are frequently killed or injured by goring and trampling.

Many devices are used to control savage bulls, but precautions should not be delayed until the bull has actually harmed someone. The first step should be dehorning, and this is best done as a calf less than one week old by clipping the hair from above the horn bud, very slightly moistening the horn bud, and then painting it with a stick of caustic potash until beads of moisture are noticed exuding from the whole of the area. The calf may then be turned out. Care should be taken not to dehorn calves by this method in wet weather, otherwise the caustic will run down the face and damage the skin, hair, and possibly the eyes. The caustic is very corrosive and the operator should take care not to allow it to come in contact with either his skin or clothing.

A baffle comprised of a leather shield fitted to a leather headstall to obstruct the normal vision of a bull.

The baffle on the bull.

All bulls should be closely watched after they have reached the age of eighteen months, but as a rule bulls are most savage between two and a half and four years old, and although a bull which remains quiet up to the age of four years usually will be quiet for the rest of his life, no risks should be taken. Savage bulls should be kept in well-fenced enclosures, where facilities are available for handling them without the farmer having to enter the yard.

A useful baffle for restricting the sight of a bull, believed to be dangerous, is illustrated. The baffle is a piece of stout leather, approximately 12 to 18 inches square, depending upon the size of the bull's head, fitted into a strong leather headstall. The baffle, with a ¾-inch strip of 24-gauge galvanized iron, is riveted securely to the forehead strap, and held in position by a strap from the centre of the forehead strap to the top of the headstall. The bottom of the baffle is fastened at the centre to the nose strap of the headstall.

The strip of galvanized iron along the top of the baffle is used to keep the baffle in position, and prevent it from sagging.

With the baffle in position the bull has free movement, but when he lowers his head, he cannot see in front, putting him at a great disadvantage should he decide to charge.

The type of baffle and headstall illustrated could be readily made by a saddler. The one shown remained in use on the same bull for two years.

Sheep

In the statement recently released by the Victorian Government Statist (Mr. O. Gawler), it is disclosed that at 31st March, 1943, there were in Victoria, 31,346 properties carrying 19,562,250 sheep.

Significant changes have taken place in the sizes of flocks since the pre-war classification in March, 1939, when there were 2,645,668 less sheep depastured in 32,232 flocks. During this period the number of flocks of under 500 sheep has decreased by 3,340, whereas the number of flocks of 500 sheep and over has increased by 2,454.

In the main wheat-growing districts (Wimmera, Mallee, and Northern), the number of holdings carrying sheep remained almost unchanged, but

Sheep Flocks in Victoria.

District.	As at 1st March, 1939.		As at 31st March, 1943.	
	Number of Flocks.	Number of Sheep.	Number of Flocks.	Number of Sheep.
Wimmera	4,548	2,450,694	4,698	3,161,917
Mallee	3,333	974,381	3,157	1,501,947
Northern	6,084	2,235,749	6,078	3,276,733
Total in main wheat areas	13,965	5,660,824	13,933	7,940,597
Western	6,529	5,879,363	5,901	5,859,959
Central	3,424	1,431,461	3,355	1,556,758
North Central	2,632	1,326,956	2,638	1,584,184
North Eastern	2,902	1,437,506	2,954	1,523,135
Gippsland	2,780	1,180,472	2,565	1,106,617
Total Victoria	32,232	16,916,582	31,346	19,562,250

SIZE AND NUMBER OF SHEEP FLOCKS IN VICTORIA.

Size of Flocks.	As at 1st March, 1939.		As at 31st March, 1943.	
	Number of Flocks.	Number of Sheep in Group.	Number of Flocks.	Number of Sheep in Groups.
Under 500 sheep	23,254	3,995,433	19,914	3,996,870
500 and under 1,000 sheep	5,017	3,479,198	6,557	4,554,785
1,000 and under 2,000 sheep	2,588	3,504,747	3,266	4,442,366
2,000 and under 5,000 sheep	1,049	3,008,251	1,281	3,680,193
5,000 and under 10,000 sheep	238	1,615,226	245	1,674,297
10,000 and under 20,000 sheep	69	857,764	71	893,181
20,000 sheep and over	17	455,963	12	320,558
Total	32,232	16,916,582	31,346	19,562,250

those carrying under 500 sheep decreased by about 2,000, while those carrying over 500 sheep increased by a similar number.

Wheat-growers appear to be running more sheep now than in 1939, as shown in the table on the previous page.

It is noted that the increase in the number of sheep carried in Victoria is 2,645,668, of which 2,279,773 are in the main wheat-growing areas.

In the principal wool-growing district (Western) the number of flocks decreased by 826—the greatest decrease.

The greatest decrease took place in the flocks with less than 500 sheep (703 decrease), and was most noticeable in the smaller groupings of under 50 sheep (415 decrease).

The above table shows the sizes of flocks in Victoria.

Pigs

As the supply of milk for pig feeding declines, pig raisers should feed increasing quantities of cereals and thus maintain or increase the number and weight of their pig output.

More pigs and larger pigs are wanted. Wheat is available at prices which enable it to be fed freely to pigs during the operation of the Pig Plan with its guaranteed pig prices.

Separated milk need not be the limiting factor in pig production; as little as ½ gallon daily to every pig from weaner to baconer stage irrespective of the size or age, will balance all wheat, barley, or pollard that pigs can eat, provided pasture, green food, or legume hay or chaff is available and the pigs have a supplement of four parts ground limestone and one part salt available at all times as a lick. They will of course require ample water to drink.

[L. A. Downey, H.D.A., Pig Expert.]

VETERINARY NOTES

Bracken Poisoning

On farms where bracken fern is troublesome, underfed cattle often help themselves to the poisonous fern shoots to satisfy their appetites, and, from time to time deaths result from what is called "Bracken Poisoning".

Preventive measures, of course, commence by eradicating where possible all bracken from the pastures to which stock have access. When this is impossible owing to shortage of manpower, cattle should be properly fed, as well-fed cattle have no desire to consume poisonous plants such as bracken fern.

Lice on Horses

Horses badly cared for and low in general health and condition are the chief sufferers from horse lice. These parasites are rarely noticed on well-fed and well-groomed animals.

There are three species of lice commonly found on horses, one, a blood-sucking variety; the other two, biting species. Sucking lice are generally found at the base of the mane and tail, while the biting varieties are usually found on other parts of the body. They all cause irritation, and losses of condition and hair.

The presence of lice is usually first indicated by the horses rubbing themselves to relieve irritation.

As a rule the hair of the affected animals is harsh and dry, and later falls out leaving bare, untidy patches. On closer examination, the lice may be seen on the skin and coat.

Lice breed rapidly and spread directly from one horse to another, or from infested stables, harness, &c.

Affected animals should be clipped, and then treated by working kerosene emulsion, sheep dip, or nicotine sulphate solution into the skin. The treatment should be repeated in two weeks, to destroy lice hatched from eggs not destroyed by the first application. Kerosene emulsion is made by mixing 1 lb. of soft soap in one gallon of hot water, and stirring in one pint of kerosene as it cools. Nicotine sulphate lotion is made by mixing 1 oz. of nicotine sulphate with 1 gallon of soapy water. Sheep dips are used in the same strength as for dipping sheep, but when used care must be taken to prevent the horses from licking the poison.

[W. D. Shew, G.M.V.C., B.V.Sc., Senior Veterinary Officer.]

Poultry

Egg Producing Regulations.

Under the amended National Security (Egg Industry) Regulations owners of 40 or less adult female fowls are permitted to sell their eggs, without restriction, at the prices approved by the Prices Commissioner. Such small owners are exempt from contributing to the control fund charge. However, owners of twelve or more adult female fowls are still required to register with the Egg and Egg Pulp Marketing Board.

Muscovy Ducks.

In Victoria, ducks are raised principally for table purposes. The Muscovy duck, which is suitable for table purposes only, is kept to a much larger extent than any other breed. This breed differs from all other breeds of domestic ducks, such as the Aylesbury, Pekin, Khaki Campbell, and Indian Runner, which have originated from the wild European Mallard. The original home of the Muscovy duck is in America, extending approximately from Mexico to Brazil. It is widely kept in the domesticated state throughout the world, and was introduced into Europe many years ago. It breeds readily enough with the common duck, but the hybrid is sterile. This fact alone points to the Muscovy being of a distinct race unrelated to the Mallard.

Another distinguishing feature of the Muscovy is the period of incubation, which is about five weeks, a week longer than for the other types. They do not quack like the common ducks. The Muscovy drake does not have curled tail feathers, but is easily recognized from the duck by his greater size and his caruncles. When mature, a Muscovy drake weighing 12 lb. is not uncommon, although the ducks are seldom more than half that weight. Although this breed is particularly active in the wild state, under domestication they have a quiet temperament and do not run about much, or lose condition by excessive exercise.

Ducks are best reared on well-drained light, sandy soil. There should be sufficient land for the growth of green food. Shade is essential, and the birds should be protected from the cold winds.

Houses for ducks should be well ventilated, with dry floors. If an outside run is provided, the size of the house may be estimated by allowing 2 to 3 square feet of floor space for each bird. They should be kept warm and comfortable at night by a covering of clean straw, sand, or other dry material on the floor.

The strongest ducklings are produced from eggs of well-matured, strong, vigorous stock. With the Muscovy, one drake can be mated with three to five ducks, kept together in separate breeding pens. It is usual for the breeding operations to be continued throughout most of the year, provided foodstuffs are available and reasonably priced. The breeder would find it to his advantage to rear his birds to mature during periods when they are in greatest demand. The beginner should not rear or fatten more than 25 birds in one flock.

Access to a pond is not absolutely necessary for Muscovy ducks. For nests, place a number of boxes containing a little sand or litter handy to the birds. The duck will usually complete her own nest with feathers from her own body.

The ducklings are best reared with the mother ducks until they are about four weeks old. They may then be taken away and put together in small batches, suitably housed, with dry floors on which is spread some clean, dry litter. It is important that ducklings be kept under clean conditions, and receive plenty of sunshine from an early age if they are to make good growth.

The principal part of all duck rations is fed as a wet mash. At the commencement, a good chick mixture, formed into a moist mash, gives satisfactory results. The rations set out in the table on the following page are recommended.

Ingredients.	Mash Mixtures.		
	1.	2.	3.
	lb.	lb.	lb.
Ground wheat	40	30	50
Ground hulled oats	20	10	30
Ground maize	20	40	..
Bran	10	10	10
Dried butter-milk	10	5	..
Meat meal	..	5	10
Common salt	½	½	½

If desired, 3 lb. of bone meal may be added to the above mixtures, but, although widely advertised, the feeding of charcoal is not recommended.

In addition, ducklings should be given an ample supply of chaffed, fresh green food daily. The young birds are usually fed all that they will eat four times daily, until they are two to three weeks old, and then three times daily until well grown. At four or five weeks of age, they may be fed a ration similar to that given to mature ducks. Suitable mixtures are as follow:—

Ingredients.	Mash Mixtures.		
	1.	2.	3.
	lb.	lb.	lb.
Ground wheat or ground barley	..	30	35
Wheat pollard	40	30	..
Ground oats	20	30	35
Bran	30	..	20
Meat meal	10	10	10

Not less than 25 per cent. of chaffed, succulent green food should be added to the above. Skim milk or boiled fresh meat may be used to replace meat-meal. The meat may consist of various carcasses, bullocks' heads, livers, &c., and the soup from these should be mixed with the mash. Meat-meal can be fed, when these offals cannot be obtained. The mashes should be fed morning and evening.

Clean drinking water must be kept continuously before the birds, and it should be placed in *deep* drinking vessels. If ducks are allowed to go short of drinking water for even a brief period they are likely to become overheated and when watered, will drink to excess. This may cause sickness or even death from cramp.

Shell grit should always be kept before the birds.

Bees

During the last two months there has been much movement of bees into areas seldom used by apiarists, due to the failure of the red and yellow gums in the western part of the State to bloom.

Apiaries have been located in many farming localities south of the Divide, showing little bee pasturage.

On cultivation land where thistle was not present, dandelion was responsible for much of the surplus honey in the colonies.

A large number of apiaries have been moved into the clover localities, the main object being to keep the bees in strength, and to replace queens, in contemplation of some honey flow occurring in the autumn.

The ground flora of the Grampians was exceptionally good during the spring, the ti-tree in particular produced high yields of honey in the Victoria Valley and Mt. William districts, and swarming was heavy in all apiaries situated in these places.

In many localities east of Stawell, apiarists have resorted to sugar-feeding as no honey was available after the Cape Weed finished blooming.

In feeding sugar to maintain brood rearing, it is a great advantage if 10 per cent. of honey can be added to the syrup. Red gum, messmate, clover, manna gum, ti-tree, or banksia honey is most suitable for this purpose.

The feeding of sugar syrup without the addition of a good breeding honey will not induce brood expansion to the same extent, or build such large brood areas. Sugar syrup is first-class food during the winter when the brood area is limited, or as an addition in the breeding periods when not quite enough nectar is coming in from natural sources.

The future movements of many apiarists appear to be to grey box for the autumn, and then on to desert banksia for the winter. Apiarists contemplating these moves would be wise to bear in mind that honey from many grey box localities is poor winter food, and that the desert banksia may be below normal in yield, as last season was one of extra heavy secretion, and it is not uncommon for lean periods to follow heavy banksia yields.

As an adjunct to the autumn stores it would be wise, if possible, to carry a good surplus from the clover regions even if the selling price is attractive.

[W. A. Collins, Apiary Inspector.]

Cereal Varieties Recommended

By W. B. MILLER, M.Agr.Sc., Senior Inspector of Agriculture

THE table hereunder sets out the list of cereal varieties, wheat, oats and barley, which are recommended by the Department of Agriculture, for sowing in the districts shown :—

WHEAT VARIETIES RECOMMENDED FOR GRAIN

Zone.	Main Sowing.	Limited Sowing.
Wimmera (black soils) ..	**Ghurka** **Quadrat**	Magnet Baldmin
Wimmera (red soils) ..	**Ghurka**	Ranee 4H Quadrat Magnet Dundee Baldmin Bencubbin
Mallee (Southern) ..	**Ghurka** **Ranee 4H** **Regalia**	Pindar Bencubbin Dundee Baldmin Quadrat
Mallee (Northern) ..	**Regalia** **Ranee 4H** **Ghurka** **Bencubbin**	Pindar Baldmin
Mid-Northern	**Ghurka** **Ranee 4H**	Quadrat Pindar Bencubbin Dundee Baldmin
East-Northern	**Ghurka** **Baldmin**	Quadrat Magnet Ranee 4H Pindar Bencubbin
Other Districts—		
(Western, Central, North-Central, and Gippsland)	**Ghurka**	Pindar Ranee 4H Mogul

OATS

For early maturing hay crops and winter grazing in all northern districts	Mulga (very early) Dawn or Fulghum if seed available, otherwise Guyra, Belar, or Gidgee
For general purposes in all districts	Algeribee (if seed available) or Algerian
For grain	Algeribee, Algerian
For spring sowing in late districts	Tartarian

BARLEY

For malting.—Prior (all districts), Research (Southern and North-Eastern Districts), and Plumage Archer (late districts).

For feed and general purposes.—Cape (all districts).

SEED AVAILABLE

Select graded seed of the varieties shown below, may be obtained from the following seed distribution farms. Permits from the Australian Wheat Board are not required for purchases from these Departmental centres. Seed will be distributed only to districts for which the variety is recommended.

Wheat

Mallee Research Station, Walpeup.—Quadrat, Pindar, Regalia, Bencubbin, Ranee 4H.

Longerenong College, Dooen.—Quadrat, Ghurka, Magnet, Ranee 4H, Baldmin, Dundee, Pindar.

Dookie College, Dookie.—Ghurka, Baldmin, Quadrat, Magnet, Ranee 4H.

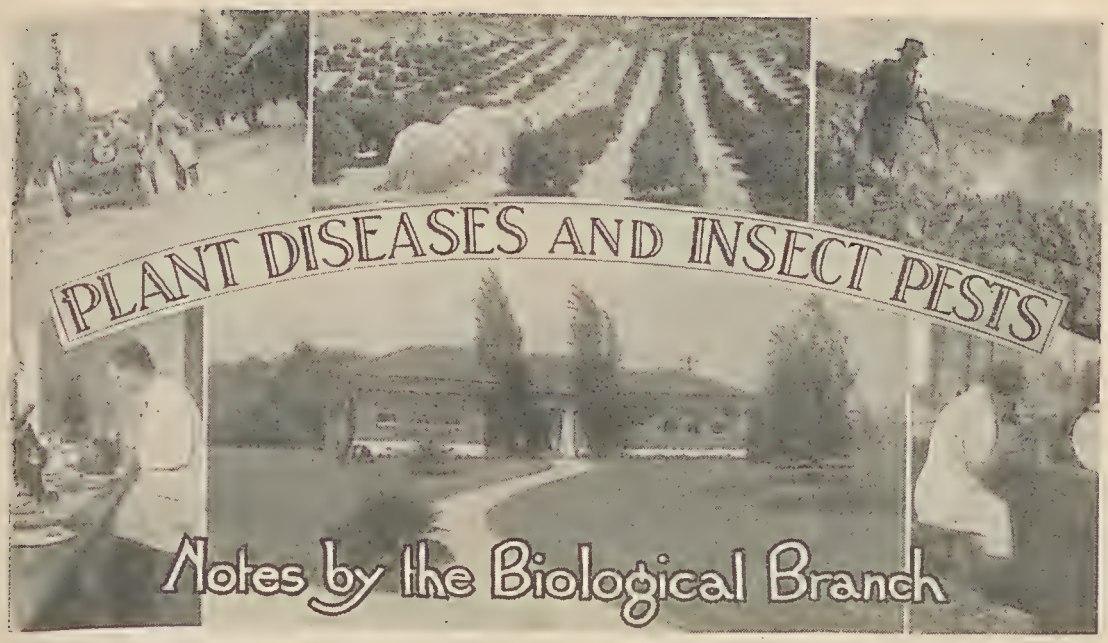
Oats

Mallee Research Station, Walpeup. Dawn, Mulga, Algeribee.

Experiment Farm, Rutherglen.—Algeribee, Dawn.

Barley

Research Farm, Werribee.—Research.



WATERY SOFT ROT OF CARROTS

Watery Soft Rot is a transit and storage disease of carrots, the importance of which cannot be over-estimated at the present time. The disease is caused by the fungal parasite, *Sclerotinia sclerotiorum.*

The organism is soil-borne and attacks a large number of agricultural crops. In Victoria, it is most destructive on carrot roots in storage and on sunflower seed crops in the field.

The fungus produces—as the name suggests—a wet soft rot which completely destroys the affected carrot roots. Roots in an advanced stage of decay are usually covered with a white fluffy mould growth which is studded with large round or oval black bodies. These structures (sclerotes) are the resting bodies which enable the fungus to overwinter in the soil.

Sclerotinia sclerotiorum is very widespread in Victoria, and sunflower seed-crops have played a very important part in the dissemination of the fungus, particularly in south-eastern Gippsland. Sunflower plants are attacked in the seedling stage, but the disease may occur in mature plants which produce viable seed before they are killed.

The fungus produces its sclerotes in the seed heads of such plants, and because many of the sclerotes are of the same size, colour, and consistency as the sunflower seed, they are not separated from the seed during the cleaning processes.

When the organism becomes established in a soil, it is very difficult to eradicate because of its extremely wide host range. In the field, the disease will attack celery, lettuce, French beans, tomatoes, cabbages, cauliflowers, potatoes, cucumbers, and sunflowers. Under

Two carrots infected with Watery Soft Rot, compared with a normal carrot.

storage conditions, the organism will attack practically all vegetable species with the exception of onion bulbs and potato tubers.

In the field, the disease is favoured by cool, moist-growing conditions, and in southern Victoria is most destructive during the spring, early summer, and late autumn. In Northern Victoria, the disease may also occur during the winter months.

According to overseas sources, the disease is most destructive to vegetable crops where weed growth is dense. This is because of the high humidity maintained around the plants which favours the rapid development of the fungus.

Observations made in carrot crops in Bermuda, where this disease is of major importance, have demonstrated that less leaf infection occurs in weeded carrot crops than in unweeded crops. Carrots with the top and outside leaves rotted with *Sclerotinia sclerotiorum* may show no root infection when lifted, but after a few days in storage they become infected either through the crown or by contact with rotted leaves.

Cold storage experiments conducted in Bermuda have also demonstrated the necessity for careful grading of the roots. Carefully graded roots developed an average of 1·1 per cent. infection with *Sclerotinia sclerotiorum* per crate, while similar carrots packed by farm labour developed 8·5 per cent. infected roots.

Experiments conducted with *Sclerotinia sclerotiorum* at the Plant Research Laboratory, Burnley, have demonstrated the rapidity of spread from diseased to healthy carrot roots. Completely rotted roots were placed in contact with healthy roots and stored at an average temperature of 65° F. and a relative humidity of 100 per cent. The healthy roots were completely rotted in five days. The fungus was also found to be capable of penetrating roots which had been dipped in white oil copper oleate and white oil Bordeaux mixture emulsions respectively.

The search for a satisfactory fungicidal dip which is non-toxic to human beings and which would prevent the development of *Sclerotinia* rot in transit and storage is still continuing.

The following recommendations are made for the benefit of carrot growers in an endeavour to minimize storage and transit losses due to *Sclerotinia sclerotiorum*:—

1. Avoid growing carrots in fields which have produced crops infected with this disease—particularly sunflower crops.
2. Practise clean cultivation, because weed growth favours disease development. If weed growth is heavy when the roots are approaching maturity, there is a likelihood of the foliage becoming infected, and the roots subsequently rotting in transit or storage.
3. Grade the roots carefully before bagging, discarding all injured or obviously diseased roots. One infected root may result in the complete destruction of every root in a bag.
4. Do not bag wet roots, because the high humidity produced in the bags will favour disease development.

OAT SMUTS

There are two types of oat smuts, known respectively as Loose Smut (*Ustilago avenæ*) and Covered Smut (*Ustilago levis*). Of these Loose Smut is the most common in Victoria. The two diseases may be distinguished by the fact that in the case of Loose Smut, the glumes as well as the grain are replaced by a mass of powdery black spores, whereas the glumes of oat plants infected with Covered Smut are *not* involved, and the grain alone is replaced by black spores. The presence of unaffected glumes makes it rather difficult to detect Covered Smut infection as

Loose Smut of oats.

the diseased panicle resembles a healthy one except that it is usually erect in habit and whitish in colour.

In both of these diseases, infection takes place in the seedling stage by means of spores carried on the seed or present in the soil. After entering the germinating seedling, the fungus establishes itself in the growing point of the plant, and continues to develop until the flowers are formed, when it enters the ovaries and produces its spores. Under natural conditions, wind-blown spores of the fungus may lodge on the seed coats of developing healthy seed before they become closely invested by the oat hull. The result is that when the grain is mature, the spores of the fungus may be covered by the oat hull, which thus makes it more difficult to treat the infected oat seed than it is to treat the seed-borne smut diseases of wheat or barley.

Seed from badly infected crops should not be used for sowing. Selected seed may be treated with copper or mercury dusts. When formalin is available, a solution 1 in 400, used at the rate of a gallon per bushel, is very effective in controlling the disease, although it is somewhat more difficult to apply, and, in addition, the seed must be sown as soon as possible after treatment.

The most convenient method of controlling these diseases is by the use of resistant varieties. The problem is complicated owing to the occurrence of physiologic races of the smut fungi. A variety may be resistant to one physiologic race and susceptible to another. The following are some of the varieties which have been claimed to be resistant to both Loose and Covered Smuts:—

Belar, Burt's Early, Frazier, Fulghum, Guyra, Kanota, Kareela, Lampton, and Myall.

Larvæ of the vegetable weevil—about four times natural size.

Covered Smut of Oats.
Left—Normal panicles. Right—Infected panicles.
[After *N.S.W. Agr. Gazette.*

BROWN VEGETABLE WEEVIL

The Brown vegetable weevil (*Listroderes costirostris* Gyll) is mainly a pest of vegetables; it damages root crops both below and above ground, and often kills young plants completely. The beetles migrate by walking, and are on the move from March to the following January. They are usually inactive in hot dry weather, preferring to hide beneath flat-leafed bushes and heaps of debris. They may travel long distances at night, and while this species has covered most of the State since its introduction, many gardeners suffering from its ravages have not been aware of the identity or even of the presence of the real culprit.

Adult beetles are most numerous in October, November, and December, while the larvæ are present on carrots, marshmallows, capeweed, &c., from March to September. Early autumn or late spring rains prolong the egg-laying period, and the time available for larvæ to develop.

Control

Hiding-places may be located and baited with pieces of carrot dusted with poison, such as calcium arsenate, sodium arsenite, or Paris green. Bran bait may be prepared from 25 lb. of bran and 12 oz. of sodium arsenite, *or* 25 oz. of sodium arsenate, *or* 16 oz. of Paris green. Two gallons of water will usually be sufficient to produce a suitable

crumbly mash for distribution. Half pound of salt or 4 lb. of molasses, when added to the bait, is thought to increase its attractiveness.

The bait, should be distributed late in the evening, as dry bait is not so attractive to the insect; repetition at intervals may be necessary in some localities. When autumn plantings are above ground, and have developed a small rosette of leaves, the centres of the crowns should be examined for the presence of very small larvæ. Where practicable, a lead arsenate spray may be given, but for large areas, lead arsenate dust will be easier to apply.

The adult vegetable weevil (approximately four times natural size).

VEGETABLE INSECT CONTROL

For successful insect control in vegetable growing, it is advisable to adopt preventive measures where possible. These measures involve weed destruction in winter or very early spring, not only on land actually required for spring and summer planting, but also on headlands, fence lines and spare ground. The *late* ploughing of a spare patch of land may be more harmful than beneficial, as pests immediately migrate from this to adjacent or succeeding crops.

Crop residues should be burned or ploughed in as soon as the last profitable picking has been taken. If green manure is required, it may be sown after this ploughing instead of relying on volunteer growth, most of which consists of insect harbouring hosts.

The foregoing may be regarded as indirect control measures. Other indirect control measures are adequate watering and fertilizing, and selection of insect-resisting varieties.

The direct methods, which include the use of poisons, are more readily appreciated as insect remedies, but should also be used where possible in the preventive way. Baiting with arsenic and bran should precede planting or transplanting where the presence of vegetable weevil or cutworms is suspected.

Nicotine and sulphur dusts should be applied early in the life of French beans on which red spider is very likely to develop. Also with young cabbages and cauliflowers, lead arsenate sprays should be applied in the seed bed and the transplants dusted regularly, since, if not protected at these early stages, the hearting propensity of the plant may be destroyed by larvæ of the cabbage moth.

It is always a wise precaution when planning for most crops to think at seeding time in terms of the pests (and diseases) likely to be encountered and survived by the crop, before it can be regarded as a first-class, readily marketable and profitable article.

IN THE ORCHARD

Contributed by Officers of the Horticultural Division

Cultivation

HOW often one hears the statement that frequent cultivation produces a loose layer of soil, the chief virtue of which is that it prevents evaporation from the underlying soil layers. The theory was that, as the soil settled down without cultivation, tubes were formed by soil particles through which large quantities of moisture passed out into the atmosphere from considerable depths by capillary action. Frequent cultivations were supposed to break down these tubes and so largely prevent moisture losses.

Although there is no doubt that cultivation is followed by good results in fruit production, the real reason for this has been overlooked and, because of the emphasis given to the above theory, many orchard soils have been over-cultivated. Careful experiments conducted several years ago, principally by Veihmeyer in California, produced facts which disproved the old soil mulch-capillary theory.

Most of the moisture losses are caused by the transpiration through leaves of trees and weeds growing in the soil, and the actual losses by evaporation from the surface soil are very small in comparison. When a comparison was made of two soils both free of weed growth, one of which was cultivated and the other uncultivated, moisture losses were the same in both cases, and very small compared with other soil carrying a heavy growth of weeds.

Following rain or irrigation, half the loss from evaporation occurs within the first week, and most of this comes from the top 4 inches of soil. Below 8 inches, which would represent the start of the root zone of most trees, the losses from evaporation are negligible.

From the available evidence, it is fairly clear that cultivation of an already bare soil is useless for conserving moisture, and in regard to the latter *the chief objective should be weed control.* In stressing this point, however, there are certain other fairly important purposes of cultivation which should not be overlooked. The tendency for some heavy soils to "set" on the surface following irrigation, necessitates cultivation to break up this crust before more water is applied. Cultivation of a "wet soil," too soon after irrigation, however, is likely to result in formation of a "plough sole" or hard pan.

On steep slopes, such as those occurring in Doncaster and Pakenham areas, cultivation which leaves the soil in a rough condition will reduce run-off by rain. Too much cultivation of such slopes, however, particularly in dry weather when there would be a tendency to form a dust mulch, may result in severe soil erosion following a heavy thunderstorm.

Ploughing is necessary for formation of a seed bed for green crops in the autumn. Ploughing under of the green crop or weed growth in the spring is also necessary to remove this competition for soil moisture and to incorporate the greenstuff with the soil. Smooth soil is desirable for passage of spray pumps and to facilitate removal of prunings, and cultivation may be necessary for this purpose.

Summed up, cultivation should not be carried out any more than is required to achieve the above results and to control weeds. It should be as shallow as possible. Excess cultivation or irrigation soil is likely to destroy its structure and make penetration of water slower.

Bad cultural practices are likely to have a serious effect on the soil over a period of years. Growers therefore are advised to consider whether their routine cultivations are necessary and in the best interests of the soil.

Apple Leaf Variegation

Numerous enquiries are received each year concerning the disease which causes leaf variegation in apples. The variegation consists of irregular yellow patches on the leaves of one particular spur or limb. Sometimes the whole tree may be affected. The spread of the disease throughout an orchard is very slow, and neither pruning nor insects appear to be factors in its transmission. Experiments have shown that it may be carried to another tree by budding or grafting operations. Fortunately, the disease is more spectacular

than destructive, and there is no evidence to show that the production of infected trees is reduced.

Pear and Cherry Slug

The pear and cherry slug has appeared on these fruit varieties. With this insect there is rarely any trouble on pear trees because the usual lead arsenate sprays are effective for control. For cherries, however, if the brown patches caused by removal of leaf tissue are visible, a spray of lead arsenate, 3 lb. powder or 6 lb. paste to 80 gallons of water should be applied as soon as the cherries have been harvested.

IN THE GARDEN

By J. L. PROVAN, B.Agr.Sc., Principal, School of Horticulture, Burnley Gardens

Watering

WATERING keeps most gardeners busy in the summer months, but all too frequently home gardeners water too lightly, giving the plants a mere sprinkling every evening. It would be much better to obtain a mechanical sprinkler and give the garden a good soaking once, or twice, a week in dry weather. A light sprinkling in the evening may serve to refresh the foliage temporarily, but the plant requires more than this, and a good soaking will supply the plant with the necessary moisture, and have a cooling effect on the hot soil in the summer. Another mistake which is also made by some gardeners is *over-watering,* particularly in light sandy soils. In light soils plant foods are very rapidly washed out, or, as it is called, "leached," by the too frequent heavy waterings which drain away into the subsoil. In such soils a better practice is to apply only sufficient water to penetrate to a depth of about 2 to 3 inches. Provided the soil is moist to this depth, plants should be able to obtain sufficient for their needs.

Many annual plants and some perennial plants which make fairly large top growth, and have slender stems, will frequently be beaten down by heavy rain or overhead sprinkling. Such plants should be supported by stakes, or watered at the base. The flower stems of the large African marigolds, when watered overhead, frequently break or bend over, due to the crinkled petals holding a considerable weight of moisture. Large-flowered dahlias also will be spoiled by too frequent overhead sprinkling.

While on the subject of watering, mention should be made of the necessity for careful and thorough sprinkling of lawns. Where lawns have been planted on slopes, or are undulating, the higher parts frequently become dry and are then difficult to saturate with water; it simply runs over the surface. By sprinkling the surface with water and loosening it with a sharp-pronged fork, and then again watering, better penetration is obtained. Any bare patches on the lawn should be examined, and often it will be found that they are caused by too little moisture.

Other Seasonal Gardening Work

Dahlia shoots will require to be tied closely against the stake. Do not make the mistake of tying too loosely, otherwise wind may cause the plant to twist round, and this sometimes breaks the stem from the tuber. During the hot weather it is necessary to keep a constant watch for red spider. This pest, which causes a light yellow mottling on the leaves, can be controlled by an application of nicotine sulphate, if available, 1 tablespoonful to 2 gallons of water. Add a tablespoonful of soft soap to increase the wetting property of this spray. Care should be taken to thoroughly spray the lower side of the foliage, because this pest usually feeds on the underside of the leaves.

When the flowering spikes of delphiniums have finished, they may be cut back to the ground, and the strong new shoots, which arise from the clump, will require to be tied as soon as they are 6 to 9 inches tall. Remove any weak shoots, as these will produce poor flowers and compete with the better shoots.

During the early part of the summer remove faded flowers as soon as possible. To allow these faded flowers to set seed often results in

a decrease in both the size and number of flowers produced later, and also shortens the flowering season. If seed is required, the plants which have been selected for this purpose could be marked by a stake, or in some other simple way, and only the later flowers should be allowed to set seed.

THE VEGETABLE GARDEN

Tomatoes

Constant attention must be given to the pruning of tomato plants during the month. Go over the bushes at least once a week while they are growing strongly, and remove the young lateral growths which appear in the axils of the leaves. All those varieties which are normally staked, i.e., the cluster and the globe types, will require this attention. *Sunnybrook, Earliana, Red Marhio, Walker's Recruit,* and *Eccle's Surprise* are varieties which require pruning and tying to stakes. When these varieties have set four clusters of fruits on the main stem, the growing point at the top should be pinched out above the leaf which is above the top cluster of fruit. If some of the clusters of fruit are too large, the individual fruit may be too small for table use. In this case remove the tips of the clusters to allow about eight fruits per cluster to develop.

Seed Sowing

The following seed can be sown this month:—Carrot, parsnip, silver beet, lettuce, (variety "Imperial 847,") peas (variety "Yorkshire Hero,") cabbage (variety "East Ham,") cauliflower (variety "Phenomenal,") and radish.

Lettuce

During the hot summer months it is better to sow lettuce seed in drills 12 to 15 inches apart, and thin out the plants to about 10 inches, than to try and transplant young lettuce plants. Water frequently and give occasional side dressings of fertilizer. Use nitrate of soda at the rate of 1 oz. per square yard, or 1 oz. per gallon of water. One or two applications, if the plants are well established, will ensure quick growth. Do not let the fertilizer touch the foliage. When the hearts have begun to develop in the lettuce plants, cease overhead watering, as this favours development of mouldy hearts. Allow the water to trickle along the furrows between the plants and keep the tops as dry as possible.

Sweet Corn

Early in January the last sowing of sweet corn can be made. In the home garden usually a single row with a spacing of 1 foot between the plants is sufficient. The best method of sowing is to place two or three seeds at intervals of 1 foot along the row and cover them to a depth of 1 to 1½ inches. Provided the soil is reasonably rich and frequent waterings are given, this crop is an easy one to grow.

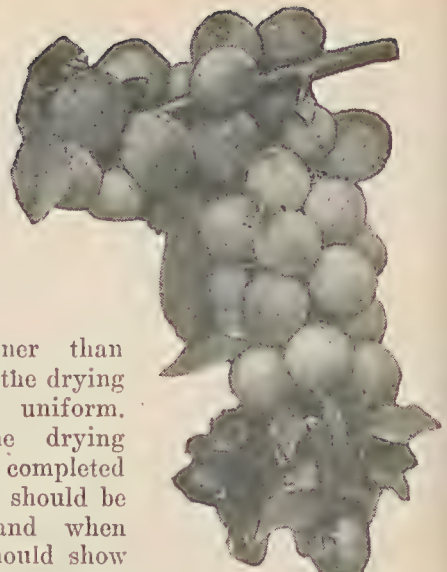
Pigs Have Gone to War!

In the tropical areas of the South West Pacific war zone, where fresh meat cannot be sent, bacon, because of its long-keeping qualities, is playing a vital part in the diet of the Australian and American fighting services.

Victoria's target of pig carcasses for the year 1944, is 30,000 tons, i.e., 25 per cent. more than Victoria's production last year. To achieve the target pigs must be made heavier, though not fatter.

Pig prices are guaranteed and wheat for feeding is available at reduced rates.

Home Drying of Plums and Apricots



By RACHEL M. PEILE, Fruit Preserving Expert

Apricot Drying

THE apricots should be quite ripe, but not overripe and should be dried in halves. The tendency of apricots to darken in colour during the drying process may be overcome by sulphuring the fruit before drying. This processing is not essential, but serves to improve the appearance of the finished product, and to retain the vitamin content.

Sulphuring.

A box fitted with a loose-fitting lid and with trays made to slip in and out readily will suit admirably for the purpose of sulphuring fruit. The trays should be made of fly wire or perforated wood and these trays may be used for drying after the fruit has been sulphured. A small receptacle containing a quantity of flowers of sulphur should be placed under the trays. The amount of sulphur required is approximately in the proportion of 1 lb. to each 100 cubic feet or about 1 oz. to each 10 lb. of fresh fruit.

The fruit is halved and the pieces are placed in single layers on the trays with the cut sides uppermost, the sulphur is ignited and the box closed. The sulphur fumes penetrate the fruit, checking the enzyme which causes discolouration.

The fruit should be left in the box for at least three hours or until the little hollows become filled with liquid which is drawn from the fruit. The trays should then be carefully removed and placed in a suitable position for drying. If drying is done out of doors the trays should be raised a little from the ground to allow the warm air to circulate around the fruit.

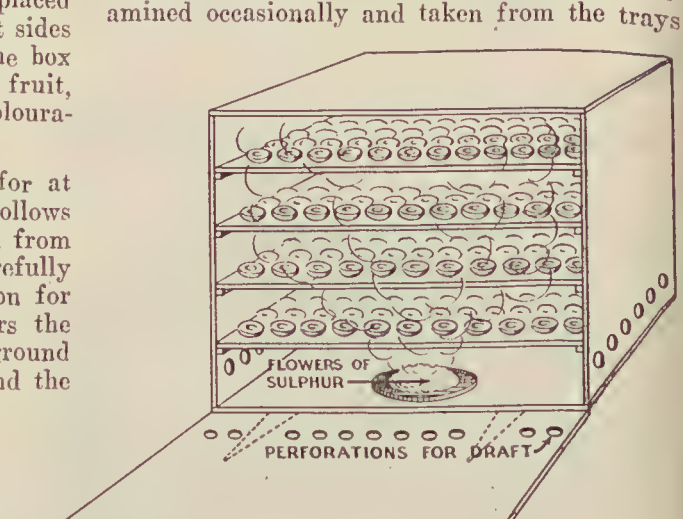
Drying.

The period required for drying varies from 2½ to 6 days according to temperatures. The pieces of fruit should be examined from time to time and some pieces removed from the trays sooner than others, as the drying is rarely uniform. When the drying process is completed the pieces should be pliable, and when twisted should show no sign of moisture. The dried fruit should be allowed to cool before it is stored in paper bags or boxes.

If the drying is carried out in a cool oven the fruit should be placed on the second or third shelf and the oven door left partly open.

Plum Drying

Sulphuring is not necessary for the dark coloured plums but it improves the appearance of lighter coloured varieties. Plums should be selected when fully ripe, cut in half and the stone removed. They should be placed on trays in single layers and dried out of doors in hot wind or sunshine. The pieces should be examined occasionally and taken from the trays



Sulphur box suitable for sulphuring apricots and plums. The trays are made of fly wire or perforated wood.

as soon as they show no sign of moisture when squeezed. Allow to cool thoroughly before storing.

When plums are dried whole they should be given a caustic soda dip to cut the bloom and cause minute cracks to open on the surface of the skin, to allow the moisture to escape more readily. The caustic solution should be made by boiling 1 oz. caustic soda to 1 gallon of water. The fruit should be immersed in the solution for 3 or 4 seconds. Rinse the fruit well and dry off the surplus moisture. Proceed with drying as described for apricots.

It is advisable when drying is done out of doors, to cover the fruit with thin pieces of cheese cloth as protection against birds and insects. Cover well at night, or move under cover as protection from damp air.

One pound of dried apricots or plums are equal to 4 or 5 lb. of fresh fruit.

Recipes

In addition to drying plums and apricots, some methods of using these fruits in a dry or fresh condition are given hereunder:—

Apricot and Light Plum Jam—

3 lb. apricots
2 lb. light plums
4½ lb. sugar
1 pint water

Prepare the fruit. Cook gently in the water until tender (about ½ hour to ¾ hour.)

Add the sugar and cook till of a good consistency.

Apricot Sauce——

8 lb. apricots
3 lb. sugar
1 oz. cloves
1 oz. peppercorns
3 pints vinegar
2 teaspoons cayenne
2 teaspoons salt
½ oz. allspice

A small handful of whole ginger (if obtainable.)

Boil till well cooked, then strain through a sieve and bottle.

Apricot Whip—

1 tablespoon gelatine
2 cups water
2 egg whites
Sugar to taste
¼ cup cold water
½ lb. dried apricots or 2 lb. fresh

Stew apricots in the 2 cups water with sugar. Mash through a sieve or strainer to make a puree. Soak gelatine in ¼ cup cold water for 10 minutes. Stand in hot water and stir till dissolved. Add to puree—allow to almost set, then fold in egg whites (stiffly beaten), then set turn out and decorate.

Plum and Mulberry Jam—

2 lb. ripe mulberries
3 lb. dark plums (firm ripe)
4 lb. sugar
½ pint water.

Cook the plums in the water for 15 minutes. Add the mulberries and cook for another 10 minutes. Add the sugar and boil until the mixture is of a good consistency (about 25 minutes.)

Plum Sponge—

1 egg
2 tablespoons melted butter
1 tablespoon sugar
2 lb. plums
1 cup flour
1 small teaspoon bicarbonate soda
1 large teaspoon of cream of tartar
4 tablespoons milk
pinch salt
flavouring

Stone the plums and stew with a little sugar and water; beat egg and sugar together, add milk and sifted flour, rising and salt; put hot stewed plums into a piedish and pour the batter on top. Bake at once in a very hot oven at first, then remove to a lower part of the oven to cook through (about half an hour.) Serve hot or cold.

Tubercle-free Herds

Accredited Tubercle-free Herds.

The following herds have been declared free of tuberculosis under the *Accredited Tubercle-free Herd Scheme* conducted by the Department of Agriculture. Under this scheme a tubercle-free accredited herd of cattle is one in which the entire herd has passed two negative, successive, annual physical examinations and tuberculin tests, or upon disclosure of infection, three semi-annual, successive physical examinations and tuberculin tests applied by a State Veterinarian or by a qualified and registered veterinarian who is approved by the Chief Veterinary Inspector for that purpose.

Name.	Address.	Number in Herd.
Ballarat Orphanage	Ballarat	135
Banyule Stud Pty. Ltd.	Wangaratta	31
Black, I. S., Estate	Mount Noorat	53
Clarke, A. B.	Glenormiston South	15
Dennis, Mrs. A. A.	Frankston	42
Dookie Agricultural College	Dookie	85
Dunbar and Clark, Messrs.	"Hazeldean Dairy," Mount Dandenong	18
Geelong Grammar School	Corio	68
Gibson, Mrs. C. S.	"Sweeney's," Eltham	35
Gorman, A. W.	"Cathcart," Alexandra	57
Henry, J. A.	Warrnambool	41
Hollaway, R. W.	Caldermeade	75
Kilmany Park Farm Home for Boys	Sale	104
Lawrence, P. H.	"Rainga," Tarrawarra	72
Longerenong Agricultural College	Dooen	43
McNabb and Son, G. A.	Irrewillipe East	154
Nancarrow Bros.	Kerang	52
Northcote Children's Farm	Bacchus Marsh	156
Onley, W. H.	"Glenholme," Caldermeade	67
Parker, Mrs. L. M.	Tallarook	56
Payne, A. E. T.	"Yarra View," Lilydale	63
Payne, T. E. N.	"Woodburn," Kilmore	46
Poole, M. A. and D.	Caldermeade	134
Poole, M. A. and D.	Yannathan	72
Powell, T. S.	"Carellen," Mansfield	46
Richardson Bros., Messrs.	"Faldinghurst," Upper Beaconsfield	30
Samuel, Misses G. and E.	Lang Lang	48
School of Horticulture	Burnley	10
State Experiment Farm	Rutherglen	40
State Research Farm	Werribee	229
Tanner, N. J.	Pakenham	33
Vagg, T. E.	Officedale	45
Wells, W. G.	Caldermeade	63

In addition to the above-mentioned, the herds set out hereunder may be considered free of tuberculosis. All these herds have given negative reactions to two or more successive tests conducted by departmental veterinary officers, but inasmuch as replacement cows are only submitted to one test before being admitted to the herds they cannot be considered as accredited under the accreditation scheme which requires, among other things, that no cow shall be admitted to the herds unless it has given two (2) negative reactions at an interval of 60 days, and must be kept in isolation during the period between the two tests.

Name.	Address.	Number in Herd at Last Test.
Alexander, Miss R.	Ballarat East	1
Anderson, A. R.	Craigieburn	123
Anderson, J. B.	Warrnambool	19
Andison, J. A.	Thomastown	46
Andrew, T. S.	Whittlesea	91
Andrew, W.	Whittlesea	160
Andrews, E. H.	Templestowe	19
Angliss, Mrs. R.	Ballarat	1
Armstrong, Mrs. M. A.	Sebastopol	15
Artley, A.	Sebastopol	11
Atkinson, A.	Cambrian Hill	21
Atkinson, V.	Cambrian Hill	26
Bailey, Mrs. A.	Doreen	11
Barclay, A. H.	Whittlesea	93
Barker, Mrs. E. M.	Huntly	11
Bates, D. S.	Whittlesea North	25
Batten, R. J.	Wollert	44
Benson, R.	South Morang	35
Blackmore, P. J.	Ballarat North	57
Blood, J.	Ballarat	8
Bodycoat, A.	Wollert	39
Booth, Mrs. A.	Warrandyte	7
Bourke, G. J.	Fairfield	82
Bourke, J. W.	Somerton	37
Bourke, W. J.	Alfredton	26
Bradbury, A. K.	Diamond Creek	50
Bradbury, G.	Kangaroo Flat	20
Brereton, E.	Kennington	25
Brock, J. N.	Epping	16
Browell, L.	Golden Square	15
Brown, Mrs. A.	Maiden Gully	11
Brown, R.	Kennington	4
Brownhill, C. E. H.	Bundoora	34
Bryden, A. C.	Bendigo	17
Bunting, J.	Craigieburn	34
Bunting, J.	Epping	35
Burke, T. S.	Huntly	19
Butler, W.	Wallan	49
Callaghan, L.	Epping	28
Carr, W. J.	Wollert	65
Cavagna, Miss	Sedgwick	7
Child, G. P.	Epping	54
Christian Bros.	Doreen	42
Clark, H. M.	Nerrina	18
Clark, P. W.	Whittlesea	58
Clemence, S.	Warrenheip	23
Cochrane, C.	Ballarat North	31
Collins, L.	Doreen	48
Cornfoot, D. H.	Whittlesea	43
Coulter, G.	Ballarat North	19
Coulthard, J. J.	Whittlesea	76
Crack, Mrs. E.	Bendigo	12
Craker, Mrs. E.	Warrandyte	2
Cross, G. A.	Mount Rowan	22
Crowle, A. J.	California Gully	16
Cumming, H. R.	South Morang	23
Cunningham, E. C.	Templestowe	23
Cupris, A.	Bullock Creek	31
Danaher, J. V.	Whittlesea	70
Danns, N. C.	Whittlesea	27
David, Mrs. M.	Ballarat	2
Deutscher, H. W.	Mernda	155
Devereux, Mrs. A.	Ballarat	3
Dickinson Bros.	Sebastopol	54
Dillon, L. W.	Epsom	18
Doggett, T.	Kangaroo Flat	17

Name.	Address.	Number in Herd at Last Test.
Douglas, Mrs. J.	Alfredton	52
Downing, J.	Canadian	5
Draper, L. S.	Wollert	31
Drysdale, J. C.	Warrandyte	41
Duke, J.	Ballarat East	1
Dunstan, W.	Pascoe Vale	32
Dwyer, F.P.	Greensborough	40
Eckersley, W. H.	Alfredton	40
Edwards, S. R.	Sebastopol	14
Elford, S.	Magpie	34
Elliott, W.	Elmore	62
English, N. J.	Donnybrook	47
Faderson, J. H.	Mandurang	108
Fergusson, M. A.	Whittlesea	115
Ferres, Mrs. M. E.	Mount Clear	21
Fitzpatrick, W.	Mandurang	9
Fitzsimons, B.	Lower Templestowe	33
Flanagan, A. D.	Epsom	10
Flynn, O.	Epsom	21
Fox, A.	Mernda	68
Franklin Bros.,	Sebastopol	29
Franklin, F. M.	Sebastopol	15
Friswell, H.	Bendigo	42
Galbraith and Walker	Greensborough	31
Gallagher, J.	Golden Square	20
Gallus, E. A.	Doncaster	14
Gamble Bros.	Greenvale	156
Gardiner, A. M., Estate of	Whittlesea	91
Gardiner, C. E.	Epping	29
Gargan, M. J.	Marshall	42
Gentner, H.	Eaglehawk	9
Gerrett, W. T.	Ballarat North	19
Gibbs, C.	Arthur's Creek	30
Gillies, N.	Diamond Creek	32
Goulden, J. B.	Wilson's Reef	54
Graff, Mrs. M. G.	Mernda	21
Graham Bros.	Whittlesea	27
Green, J.	Eppalock	15
Green, W.	Mernda	7
Greer, A.	Wollert	32
Guidice J. J.,	Kangaroo Flat	17
Gunn, A. J. B.	Ballarat	7
Gunn, W.	Kangaroo Flat	10
Hall, Mrs. J. E.	Whittlesea North	13
Hamilton Bros.	Huntly	17
Hancorne, Miss M. R.	Yan Yean	34
Hanrahan, Miss E.	Sebastopol	4
Hanrahan, N.	Sebastopol	6
Hargreaves, W.	Emu Creek	10
Harmer, L. T.	Thomastown	44
Harrison, H. N.	Ballarat	17
Hawkes, Miss D.	Warrandyte	21
Hayes, J. J.	Smythe's Creek	6
Hedges, J. T.	Ballarat	9
Hehr, R.	Wollert	34
Henderson, J.	Donnybrook	58
Henshaw, E.	Lower Templestowe	9
Henshaw, Miss A.	Templestowe	16
Herd, J.	Epping	46
Hewitt, C. J.	Wattle Glen	7
Hewitt, H.	Ballarat	13
Higgs, R. N.	Yan Yean	76
Hilderbrand, P.	Sebastopol	21
Hill, J.	Somerton	86
Hill, W.	Somerton	39
Hogan, Miss M.	Cambrian Hill	20
Hobbs, Mrs. F. J.	Doncaster East	5
Hocking, A. R.	Canadian	12
Houlahan, P.	Eppalock	40
Houlahan, T. J.	Eppalock	43
Howell, G. G.	Wollert	221
Hoy, T.	Kennington	26
Huggins, R. E.	Ballarat	1
Hughes, Mrs. R. E.	Ballarat East	14
Jackson, Mrs. M. A.	Heidelberg	11
Jackson, Mrs. M.	South Warrnambool	6
Janefield Farm	Bundoora	43
Jeffrey, J. T.	Mernda	93
Jenkins, Mrs. A.	Mount Rowan	22
Jenkins, T. H.	Whittlesea	24
Johnstone, Miss J. A.	Mernda	12
Jolley, J.	Epping	64
Jones, S. E.	Campbellfield	23
Jones, S. G.	Epsom	13
Jukes, C.	Epping	39
Jukes, W. H.	South Morang	28
Junor, G. M.	South Morang	56
Kell, W. E.	Greensborough	28
Kerr, J.	Mandurang	7
Kerwin, H. E.	Eaglehawk	21
Kilpatrick, E.	Mernda	89
Kinnersley, F. and Son	Wendouree	19
Kirkwood, S.	Eaglehawk	12
Knight Bros.	White Hills	42
Knight, G. A.	Sebastopol	29
Knowles, J. T.	Ballarat	3
Lacy, G. C. and Son	Cambrian Hill	32
Lacy, N. C.	Cambrian Hill	13
Lane, J.	Warrnambool	9
Latta, Mrs. J.	Warrnambool	6
Lawry Bros.	Tandara	113
Lehmann, A. H.	Epping	36
Lethlean, S. J.	Epping	27
Levett, E.	Warrnambool	12
Leviston, A. E.	Ballarat East	25
Leviston, G.	Ballarat East	9
Lewis Bros.	Beveridge	64
Lodington, Mrs. I. E. M.	Ballarat	8
Love, J. E.	Strathfieldsaye	16
McCormack, D.	Woodstock	59
McCulloch, A. A.	Warrnambool	28
McDowell, R. H.	Greensborough	26
McGregor, W. B.	Mernda	44
McKay, J. M.	Wallan	62
McKay, L.	Kal Kallo	12
McKay, Miss E.	Donnybrook	51
McKay, Mrs. H. E.	Ballarat South	10
McKendry, J.	Doreen	69
McKenzie, D. I.	Marong	95
McKernan, A. H.	Whittlesea	35
McKie, J. W.	Wollert	81
McLean, J. F.	Bundoora	32
McManus, D. J.	Napoleons	18
McManus, J. W.	Napoleons	14
McPhee, K.	Whittlesea	106
McPherson, A.	Yan Yean	82
Maltzahn, Mrs. E. N.	Campbellfield	45
Mannes, W.	Strathfieldsaye	39
Martin, Miss A.	Napoleons	21
Martin, Miss G.	Ballarat	11
Martin, W. B.	Ballarat	20
Mason, Arthur	Donnybrook	62
Mason, N.	Donnybrook	52
Maxwell, J.	Whittlesea	32
Mays, Mrs. A. M.	Doncaster	6
Melling, T.	Kennington	16
Menhennett, F. W.	Sebastopol	21
Mercer, H.	Long Gully	18
Millar, Mrs. G.	Smythe's Creek	51
Miller, A. J.	Whittlesea North	50
Miller Bros.	Greensborough	44
Miller, D.	Epping	42
Morris, C.	Sebastopol	28
Morris, E. J.	Huntly	19
Mortimer, S.	Epping	29
Mosig, H. C.	Epping	26
Murfet, Mrs. S.	Huntly	21
Nankervis, L.	Mandurang	15
Nash, H. A.	Tullamarine	41
Nebel, Mrs. A. E.	Thomastown	36
Nestor Bros.	Wendouree	40
Nickols Bros.	Tandara	72
Noonan, J.	Sedgwick	50
O'Dell, J. E.	Ballarat East	21
O'Donnell, P.	Wendouree	38
O'Hern, T.	Epping	58
O'Keefe, J. P.	Warrnambool	21
Oliver, W.	Campbellfield	72
Olliver, Mrs. S. E.	Ballarat	14
Page, F. J.	Mount Rowan	38
Parker, R. H.	Craigieburn	91
Patullo, F. E.	Mickleham	36
Pearce, A. E.	Mandurang	55
Pearce, J.	Mandurang	24
Pentland, E.	Maiden Gully	8
Pentland, F. C.	Marong	26
Pepper, D. S.	Wattle Glen	38
Phillips, E.	Mt. Pleasant	22
Pilcher, W.	Kangaroo Flat	13
Pitson, R. H.	Yarrambat	19
Portingale, J.	Campbellfield	42
Power, L. J.	Mernda	39

Name.	Address.	Number in Herd at Last Test.
Quinlan Bros.	Epping	48
Ramage, J.	Mt. Pleasant	28
Rawlings, J. H.	Whittlesea North	31
Renkin, R.	Ballarat East	11
Richards, T.	Ballarat	29
Richards, W. J.	Warrenheip	20
Roche, Mrs. S. M.	South Morang	79
Rodgers, E.	Whittlesea North	14
Rosewarne, Miss P.	Yan Yean	49
Rowe, Mrs. M.	Eaglehawk	19
Ruff, A.	White Hills	12
Salathiel, R. W.	Big Hill	14
Salau, E.	Strathfieldsaye	12
Scheuffele, C.	Epsom	24
Schreenan, E. and Son	Sebastopol	73
Scott, C. M.	Diamond Creek	49
Seeber, B.	Thomastown	28
Semmens, J. H.	Sedgwick	18
Shaw-Logan, T.	Glenroy	103
Sheahan, J.	Templestowe	30
Shearer, G.	Warrenheip	18
Shearer, J.	Warrenheip	11
Sheeky, A. A.	Templestowe	24
Siebel, F.	Thomastown	29
Smirfitt, J. E.	Epping	52
Smith, F. A.	Invermay	15
Smith, H. H.	Heidelberg	33
Smith, J. R.	Mernda	28
Smith, L. W. W.	Bundoora	81
Smith, M.	Heidelberg	43
Smith, R. A.	Epping	26
Smith, S. E.	Epping	33
Smith, S. H. A.	Yan Yean	17
Sobey Bros.	Napoleons	66
Somerville, A.	Strathfieldsaye	15
Somerville, J.	Strathfieldsaye	14
Somerville, M.	Strathfieldsaye	15
Somerville, P.	Strathfieldsaye	23
Somerville, W.	Strathfieldsaye	48
Southon, H. W.	South Morang	60
Spedding, Mrs. S. A.	Ballarat North	5
Spruzen, G.	Wollert	41
Stacey, R.	Warrenheip	29
Stephens, H.	Epping	53
Stevenson, E.	Wendouree	10
Stimson, T.	Woodstock	33
Story, A. E.	Emu Creek	36
Story, T.	Mandurang	24
Stuart, W. A.	Black Hill	3
Swanton, Mrs. C.	Invermay	41
Thomas, Mrs. E.	Broadmeadows	11
Thomas, J.	Mandurang	39
Thomas, Mrs. V. E.	Yan Yean	31
Thompson, A. E.	Sebastopol	3
Toman, Mrs. A.	Golden Square	15
Toshack, H. J.	Wendouree	38
Towt, C. W.	Glenvale	147
Trahair, R.	Maiden Gully	49
Trethewey, R. T.	Epsom	7
Trethowan, F. W.	Donnybrook	118
Trist, H. P.	Greensborough	8
Troutbeck, H. R.	Mickleham	47
Tuddenham, F. T.	Cherry Tree	19
Tuddenham, M. J.	Cherry Tree	36
Twomey, A.	Greenvale	39
Underwood, N.	Alphington	13
Vallence, C. A.	Epping	19
Van, E. L.	Templestowe	25
Vernon Estate	Cherry Tree	46
Vincent, Mrs. A.	Warrenheip	19
Waller, R.	Ballarat	26
Watkins, F.	Campbellfield	71
Wheeler, W. A.	South Morang	34
Whelpton, B.	Whittlesea North	88
White, L. and S.	Alfredton	53
White, T. L. R.	Alfredton	53
White, W.	Greensborough	17
White, W. H.	Ballarat West	17
White, W. H.	Smythe's Creek	57
White, W. J.	Alfredton	18
Whitelock, E. A. and E. J.	Epsom	23
Whitfield, A. E.	Bendigo	6
Whittingham, E. W.	Greensborough	41
Wicks, C.	Golden Square	18
Wightman, T. A.	Ballarat East	11
Williams, E. A.	Thomastown	32
Williams and Berryman	Bendigo	15
Williamson, H.	Invermay	40
Williamson, J.	Doncaster (High-st.)	4
Willis Bros.	Craigieburn	61
Wilson, J. L.	Diamond Creek	9
Wilson, Mrs. M.	South Morang	12
Wooster, G. S.	Watsonia	23
Wrest, W.	Epping	77
Wuchatsch, J. D.	Epping	17
Yann, R.	Wollert	52
Young, G. T.	Sedgwick	63
Young, J. A.	Sedgwick	39
Young, W. S.	Sedgwick	54
Ziebell, H.	Thomastown	32

There are also 725 herds in which 14,117 head of cattle have passed one test, and may be considered, therefore, to be in process of becoming tubercle-free herds.

Registered Fertilizers

Analyses and Unit Values

Fertilizers Act 1928 (No. 3680).

UNIT VALUES FOR THE YEAR 1944.

	£	s.	d.
Nitrogen, organic, as Blood; Blood and Bone; Blood, Bone, and Flesh; and Bone ..	1	0	0
,, as Nitrate	1	3	7
,, as Ammonia	0	18	0
Phosphoric Acid—			
as Water Soluble in Superphosphate and Mixed and Complete Fertilizers containing Superphosphate	0	6	8
as Citrate Soluble	0	5	0
as Citrate Insoluble—			
in Superphosphate	0	2	0
in other Fertilizers	0	5	0
Potash—			
as Sulphate	0	9	3
as Chloride	0	8	0

Melbourne, 6th December, 1943.

W. R. JEWELL, M.Sc., F.I.C.,
Chemist for Agriculture.

LIST OF FERTILIZERS REGISTERED AT THE OFFICE OF THE DIRECTOR OF AGRICULTURE UNDER THE FERTILIZERS ACT 1928 (No. 3680) FOR THE YEAR 1944.

Description of Fertilizer.	Brand.	Nitrogen.						Phosphoric Acid.				Potash as Unspecified.	Price asked per ton.*	Where Obtainable.
		As Nitrate.	As Ammonia.	As Blood.	As Blood and Bone.	As Blood, Bone, and Flesh.	Total.	As Water Soluble.	As Citrate Soluble.	As Citrate Insoluble.	Total.			
		%	%	%	%	%	%	%	%	%	%	%	£ s. d.	
Nitrogenous—Readily Available.														
Nitrate of Soda	Sickle in diamond	15·50	..	..	..	..	15·50	..	..	..	..	..	18 10 0	Commonwealth Fertilizers and Chemicals Ltd., 65 William-st., Melbourne
,, ,,	Pivot ..	16·00	..	..	..	..	16·00	..	..	..	..	..	18 10 0	The Phosphate Co-operative Co. of Aust. Ltd., 447 Little Collins-st., Melbourne
,, ,,	Cresco ..	15·50	..	..	..	..	15·50	..	..	..	..	..	18 10 0	Cresco Fertilizers Ltd., Little Malop-st., Geelong
Sulphate of Ammonia	M.G. Co. in diamond	..	20·50	..	..	..	20·50	..	..	..	..	..	18 10 0	The Metropolitan Gas Co., 196 Flinders-st., Melbourne
,, ,,	Pivot ..	..	20·60	..	..	..	20·60	..	..	..	..	..	18 10 0	The Phosphate Co-operative Co. of Aust. Ltd., 447 Little Collins-st., Melbourne
,, ,,	Sickle in diamond	..	20·60	..	..	..	20·60	..	..	..	..	..	18 10 0	Commonwealth Fertilizers and Chemicals Ltd., 65 William-st., Melbourne
,, ,,	Cresco ..	..	20·60	..	..	..	20·60	..	..	..	..	..	18 10 0	Cresco Fertilizers Ltd., Geelong
Moderately Available.														
Dried Blood ..	Fitzroy ..	..	..	13·00	..	..	13·00	..	..	..	..	..	13 0 0	W. Angliss and Co. (Aust.) Pty. Ltd., 42 Bourke-st., Melbourne
,, ,, ..	T.B. & S. in diamond—Brooklyn	..	..	12·00	..	..	12·00	..	..	..	..	..	12 0 0	Thos. Borthwick and Sons (A/asia) Ltd., 84 William-st., Melbourne
,, ,, ..	T.B. & S. in diamond—Portland	..	..	12·00	..	..	12·00	..	..	..	..	..	12 0 0	Thomas Borthwick and Sons (A/asia) Ltd., 84 William-st., Melbourne
,, ,, ..	M.C.C. in diamond	..	..	12·00	..	..	12·00	..	..	..	..	..	12 0 0	Melbourne City Council, Town Hall, Melbourne

LIST OF FERTILIZERS REGISTERED AT THE OFFICE OF THE DIRECTOR OF AGRICULTURE UNDER THE FERTILIZERS ACT 1928 (No. 3680) FOR THE YEAR 1944—*continued.*

Description of Fertilizer.	Brand.	Nitrogen.						Phosphoric Acid.				Potash as Unspecified.	Price asked per ton.*			Where Obtainable.
		As Nitrate.	As Ammonia.	As Blood.	As Blood and Bone.	As Blood, Bone, and Flesh.	Total.	As Water Soluble.	As Citrate Soluble.	As Citrate Insoluble.	Total.		£	s.	d.	
		%	%	%	%	%	%	%	%	%	%	%				
Dried Blood ..	Pannifex's	..	..	12·00	..	..	12·00	..	..	..	..	..	12	0	0	H. C. Pannifex and Co. Pty. Ltd., 53–57 Munster-terrace, North Melbourne
.. .. ..	Pannifex's (B)	..	..	13·00	..	..	13·00	..	..	..	..	..	13	0	0	.. .. ..
.. .. ..	Champion ..	..	..	13·00	..	..	13·00	..	..	..	..	..	13	0	0	Sims Cooper (Freezing Works) Pty. Ltd., 31 Queen-st., Melbourne
Blood Manure ..	Pentagon ..	..	..	10·50	..	..	10·50	..	..	..	..	..	10	10	0	Mulgrave By-Products Co., North-road, East Oakleigh
.. .. ..	M.C.C. ..	..	..	8·00	..	..	8·00	..	..	..	..	..	8	0	0	Melbourne City Council, Town Hall, Melbourne
.. .. ..	Pannifex's ..	..	..	8·50	..	..	8·50	..	..	..	..	..	8	10	0	H. C. Pannifex and Co. Pty. Ltd., 53–57 Munster - terrace, North Melbourne
Slowly Available.																
Castor Meal ..	Alba ..	..	..	.	..	..	5·00 (as castor meal)	..	..	2·25	2·25	·75	4	5	0	Lycett Proprietary Ltd., Normanby-rd., Montague
.. .. ..	L.F.X. ..	..	..	..	..	..	5·00 (as castor meal)	..	..	2·25	2·25	·75	4	5	0	Lawford's Fruit Exchange Pty. Ltd., Doncaster
Rape Seed Meal	Alba ..	..	..	..	..	..	5·50 (as rape seed meal)	..	..	1·75	1·75	1·50	5	5	0	Lycett Proprietary Ltd., Normanby-rd., Montague
Flesh, Hoof, and Treated Leather	No. 3 Fertillo	8.0 (As Flesh, Hoof, and Treated Leather)	..	..	..	..	8·00	..	..	..	..	..	8	0	0	Glues and By-Products Pty. Ltd., 86 King-st., Melbourne
Phospatic—Readily Available.																
Superphosphate 18 per cent.	Cresco ..	..	..	..	..	..	..	14·00	2·50	1·50	18·00	..	5	6	0	Cresco Fertilizers Ltd., Geelong
.. ..	Sickle in diamond	..	..	..	..	..	..	14·00	2·50	1·50	18·00	..	5	6	0	Commonwealth Fertilizers and Chemicals Ltd., 65 William-st., Melbourne
.. ..	Pivot ..	..	..	..	..	..	..	14·00	2·50	1·50	18·00	..	5	6	0	The Phosphate Co-operative Co. of Aust. Ltd., 447 Little Collins-st., Melbourne
Phosphate—Moderately Available.																
Basic Super. reverted	Sickle in diamond	..	..	..	..	..	..	..	12·10	3·20	15·30	..	6	0	0	Commonwealth Fertilizers and Chemicals Ltd., 65 William-st., Melbourne
Basic Super. reverted	Pivot ..	..	..	..	..	..	..	..	12·10	3·20	15·30	..	6	1	3	The Phosphate Co-operative Co. of Aust. Ltd., 447 Little Collins-st., Melbourne
Potassic—Readily Available.																
Sulphate of Potash	Cresco ..	..	..	..	..	..	..	..	..	..	..	48·50	22	10	0	Cresco Fertilizers Ltd., Geelong
.. ..	Pivot ..	..	..	..	..	..	..	..	..	..	..	48·50	22	10	0	The Phosphate Co-operative Co. of Aust. Ltd., 447 Little Collins-st., Melbourne
.. ..	Sickle in diamond (90%)	..	..	..	..	..	..	..	..	..	..	48·50	22	10	0	Commonwealth Fertilizers and Chemicals Ltd., 65 William-st., Melbourne
Muriate of Potash	Sickle in diamond (80%)	..	..	..	..	..	..	..	..	..	..	50·00 (as chloride)	20	0	0	.. .. ..

LIST OF FERTILIZERS REGISTERED AT THE OFFICE OF THE DIRECTOR OF AGRICULTURE UNDER THE FERTILIZERS ACT 1928 (No. 3680) FOR THE YEAR 1944—*continued.*

Description of Fertilizer.	Brand.	Nitrogen.						Phosphoric Acid.				Potash as Unspecified.	Price asked per ton.*			Where Obtainable.
		As Nitrate.	As Ammonia.	As Blood.	As Blood and Bone.	As Blood, Bone, and Flesh.	Total.	As Water Soluble.	As Citrate Soluble.	As Citrate Insoluble.	Total.					
		%	%	%	%	%	%	%	%	%	%	%	£	s.	d.	
Murate of Potash	Cresco ..	..	..	..	..	..	..	..	..	..	..	50·00 (as chloride)	20	0	0	Cresco Fertilizers Ltd., Geelong
,, ,,	Pivot ..	..	..	..	..	..	..	..	..	..	..	50·00 (as chloride)	20	0	0	The Phosphate Co-operative Co. of Aust. Ltd., 447 Little Collins-st., Melbourne
Potassium - Ammonium Nitrate	C.H.F. Nitro-Potash	16.00	13.00	..	..	..	29.00	..	..	..	..	9.00 (Potash as Nitrate)	30	0	0	C. H. Fairbanks Stores Pty. Ltd., 110 Pt. Nepean-rd. Cheltenham
FERTILIZERS. MIXED *Containing Nitrogen and Phosphoric Acid—Readily Available.*																
Super. and Ammonia	Cresco (3 and 1)	..	5·00	..	..	..	5·00	12·60	·30	·60	13·50	..	9	6	9	Cresco Fertilizers Ltd., Geelong
,, ,,	Cresco (6 and 1)	..	2·90	..	..	..	2·90	14·30	·35	·75	15·40	..	7	18	0	,, ,, ,,
,, ,,	Pivot II. (3 and 1)	..	5·00	..	..	..	5·00	10·50	1·80	1·20	13·50	..	9	6	9	The Phosphate Co-operative Co. of Aust. Ltd., 447 Little Collins-st., Melbourne
,, ,,	Pivot I. (6 and 1)	..	2·90	..	..	..	2·90	12·00	2·10	1·30	15·40	..	7	18	0	,, ,, ,,
,, ,,	Sickle in diamond (3 and 1)	..	5·00	..	..	..	5·00	10·50	1·80	1·20	13·50	..	9	6	9	Commonwealth Fertilizers and Chemicals Ltd., 65 William-st., Melbourne
,, ,,	Sickle in diamond (6 and 1)	..	2·90	..	..	..	2·90	12·00	2·10	1·30	15·40	..	7	18	0	,, ,, ,,
Nitro Superphosphate	Sickle in diamond	..	1·50	..	..	0·50	2·00	11·60	2·60	1·80	16·00	..	7	15	0	,, ,, ,,
,, ,,	Cresco ..	..	1·50	..	·50	..	2·00	14·40	·60	1·00	16·00	..	7	15	0	Cresco Fertilizers Ltd., Geelong
Moderately Available.																
Blood, Bone, and Super.	Sickle in diamond	..	..	..	..	2·50	2·50	9·30	4·10	3·40	16·80	..	7	18	6	Commonwealth Fertilizers and Chemicals Ltd., 65 William-st., Melbourne
Bone and Super.	Sickle in diamond, No. 1	..	..	..	..	2·00	2·00	8·00	4·20	5·60	17·80	..	7	17	0	,, ,, ,,
,, ,,	Cresco No. 1 ..	..	..	..	2·00	..	2·00	9·90	4·20	3·70	17·80	..	7	17	0	Cresco Fertilizers Ltd., Geelong
Super. and Bone	Cresco No. 2 ..	..	..	..	..	1·00	1·00	14·80	1·00	1·40	17·20	..	7	5	9	,, ,, ,,
,, ,,	Sickle in diamond, No. 2	..	..	..	..	1·00	1·00	11·80	3·10	2·30	17·20	..	7	5	9	Commonwealth Fertilizers and Chemicals Ltd., 65 William-st., Melbourne
Nitrogen—Slowly Available.																
Flesh, Hoof, and Treated Leather with Bone	Fertillo No. 4	5·55 (As Flesh, Hoof, and Treated Leather)	..	·20 (as bone)	..	..	5·75	..	4·00	6·00	10·00	..	8	0	0	Glues and By-Products Pty. Ltd., 86 King-st., Melbourne
,, ,,	Pannifex's (G)	4·75 (As Flesh, Hoof, and Treated Leather)	..	1·50 (as bone)	..	..	6·25	..	7·25	6·25	13·50	..	9	12	6	H. C. Pannifex and Co. Pty. Ltd., 53–57 Munster-terrace, North Melbourne

LIST OF FERTILIZERS REGISTERED AT THE OFFICE OF THE DIRECTOR OF AGRICULTURE UNDER THE FERTILIZERS ACT 1923 (No. 3680) FOR THE YEAR 1943—*continued.*

Description of Fertilizer.	Brand.	Nitrogen.						Phosphoric Acid.				Potash as Unspecified.	Price asked per ton.*	Where Obtainable.
		As Nitrate.	As Ammonia.	As Blood.	As Blood and Bone.	As Blood, Bone, and Flesh.	Total.	As Water Soluble.	As Citrate Soluble.	As Citrate Insoluble.	Total.			
		%	%	%	%	%	%	%	%	%	%	%	£ s. d.	
ANIMAL FERTILIZERS. *Containing Nitrogen and Phosphoric Acid—Moderately Available.*														
Blood and Bone	Sickle in diamond	..	..	..	..	5·00	5·00	..	5·00	9·00	14·00	..	8 0 0	Commonwealth Fertilizers and Chemicals Ltd., 65 William-st., Melbourne
„ „	Sickle in diamond (No. 2)	..	..	..	..	7·25	7·25	..	6·00	7·00	13·00	..	9 10 0	„ „ „
„ „	J. A. Dundas'	..	..	..	..	4·50	4·50	..	7·14	13·61	20·75	..	9 13 9	J. A. Dundas, Dynon-rd., Footscray
„ „	Corio ..	..	..	..	4·50	..	4·50	..	6·00	8·00	14·00	..	8 0 0	The Corio Trading Co. Pty. Ltd., 164 Moorabool-st., Geelong
„ „	Fitzroy Special	..	..	..	..	5·00	5·00	..	13·00	5·00	18·00	..	9 10 0	W. Angliss and Co. (Aust.) Pty. Ltd., 42 Bourke-st., Melbourne
„ „	Premier ..	..	..	..	..	7·00	7·00	..	6·50	5·50	12·00	..	10 0 0	„ „ „
„ „	Murray ..	..	..	..	5·25	..	5·25	..	4·50	7·50	12·00	..	8 5 0	Western and Murray Co-operative Bacon and Meat Packing Co. Ltd., 522 Flinders-lane, Melbourne
„ „	Pridham's ..	..	..	..	5·10	..	5·10	..	6·00	8·00	14·00	..	8 10 0	W. Pridham Pty. Ltd., Evans-st., Braybrook
„ „	Ibis ..	..	..	..	..	5·25	5·25	..	8·41	6·17	14.58	..	8 18 0	Ficken, Halliday, and McClelland Pty. Ltd., 634 Bourke-st., Melbourne
„ „	P.M. ..	..	..	..	..	7·00	7·00	..	6·31	5·69	12·00	..	10 0 0	J. Kitchen and Sons Pty. Ltd., Ingles-st., Port Melbourne
„ „	Solo ..	..	..	..	..	7·00	7·00	..	4·25	10·75	15·00	..	10 15 0	„ „ „
„ „	Cockatoo ..	..	..	..	..	5·18	5·18	..	10·97	8·00	18·97	..	8 10 0	R. Fordham, Cressy-rd., Camperdown
„ „	Echuca ..	..	..	..	..	4·83	4·83	..	8·17	7·65	15·82	..	8 15 9	Echuca Freezing Works, Goulburn-rd., Echuca East
„ „	Champion ..	..	..	..	7·00	..	7·00	..	3·50	4·50	8·00	..	9 0 0	Sims Cooper (Freezing Works) Pty. Ltd., Henty House, 499 Little Collins-st., Melbourne
„ „	Fitzgerald's ..	..	..	..	5·00	..	5·00	..	8·50	6·50	15·00	..	8 15 0	P. Fitzgerald and Sons, Oakleigh
„ „	T.B. and S. in diamond (Portland)	..	..	..	6·00	..	6·00	..	7·00	5·00	12·00	..	9 0 0	Thos. Borthwick and Sons (A'asia) Ltd., 84 William-st., Melbourne
„ „	T.B. and S. in diamond No. 1 (Brooklyn)	..	..	..	6·00	..	6·00	..	7·00	5·00	12·00	..	9 0 0	„ „ „
„ „	T.B. and S. in diamond No. 2 (Brooklyn)	..	..	..	4·50	..	4·50	..	7·00	11·00	18·00	..	9 0 0	„ „ „
„ „	Apex ..	..	..	..	..	5·00	5·00	..	7·00	8·00	15·00	..	8 15 0	North-Eastern Bone Products, Wangaratta
„ „	Pannifex's (A)	..	..	..	..	7·00	7·00	..	6·00	8·00	14·00	..	10 10 0	H. C. Pannifex and Co. Pty. Ltd., 53–57 Munster terrace, North Melbourne
„ „	Pannifex's (B)	..	..	..	..	7·00	7·00	..	3·00	4·00	7·00	..	8 15 0	„ „ „
„ „	Pannifex's (C)	..	..	..	..	5·00	5·00	..	6·00	8·00	14·00	..	8 10 0	„ „
„ „	Pannifex's (D)	..	..	..	..	5.00	5·00	..	4·00	6·00	10·00	..	7 10 0	„ „ „
„ „	Pannifex's (E)	..	..	..	..	8·00	8·00	..	3·00	5·00	8·00	..	10 0. 0	„ „ „
„ „	Pannifex's (F)	..	..	..	..	5·39	5·39	..	6·87	9·50	16·37	..	9 9. 6	„ „ „
„ „	Valley ..	..	..	..	..	6·17	6·17	..	4·81	2·75	7·56	..	8 0 0	Goulburn Valley Freezing Works, Shepparton
„ „	M.S.C. ..	..	..	..	6·25	..	6·25	..	4·50	6·25	10·75	..	8 18 9	Mildura Shire Council, Mildura

LIST OF FERTILIZERS REGISTERED AT THE OFFICE OF THE DIRECTOR OF AGRICULTURE UNDER THE FERTILIZERS ACT 1928 (No. 3680) FOR THE YEAR 1944—*continued.*

Description of Fertilizer.	Brand.	Nitrogen.						Phosphoric Acid.				Potash as Sulphate.	Price asked per ton.*	Where Obtainable.
		As Flesh Hoof and Treated Leather.	As Ammonia.	As Bone.	As Blood and Bone.	As Blood, Bone, and Flesh.	Total.	As Water Soluble.	As Citrate Soluble.	As Citrate Insoluble.	Total.			
		%	%	%	%	%	%	%	%	%	%	%	£ s. d.	
Blood and Bone	Arch No. 1 ..	..	..	..	7·00	..	7·00	..	7·00	4·00	11·00	..	9 15 0	Victorian Inland Meat Authority, 54 Market-st., Melbourne
,, ,,	Arch No. 2 ..	..	..	..	7·00	..	7·00	..	7·00	4·00	11·00	..	9 15 0	,, ,, ,,
Animal Fertilizer	A and A ..	..	..	..	5·00	..	5·00	..	4·00	10·00	14·00	..	8 10 0	G. W. Pennell (dec'd), Burke-st., Braybrook.
COMPLETE FERTILIZERS. *Containing Nitrogen, Phosphoric Acid, and Potash—Readily Available*														
Complete Fertilizer	Sickle in diamond (Market Garden)	..	1·70	..	..	1·75	3·45	8·20	3·90	3·35	14·95	2·42	9 18 9	Commonwealth Fertilizers and Chemicals Ltd., 65 William-st., Melbourne
,, ,,	Sickle in diamond (A) (5.1.1.)	..	2·90	..	..	..	2·90	10·00	1·80	1·10	12·90	6·90	10 14 0	,, ,, ,,
,, ,,	Sickle in diamond (C) (4.4.1.)	..	9·15	..	..	..	9·15	6·20	1·10	·70	8·00	5·39	14 5 6	,, ,, ,,
,, ,,	Pivot IV. (5.1.1)	..	2·90	..	..	..	2·90	10·00	1·80	1·10	12·90	6·90 as sulphate	10 14 0	The Phosphate Co-operative Co. of Aust. Ltd., 447 Little Collins-st., Melbourne
,, ,,	Cresco (Market Garden)	..	1·70	..	1·50	..	3·20	11·90	1·10	1·70	14·70	2·42	9 18 9	Cresco Fertilizers Ltd., Geelong
,, ,,	Cresco, No. 2 (4.4.1)	..	9·15	..	..	..	9·15	7·40	·20	·40	8·00	5·39	14 5 6	,, ,, ,,
,, ,,	Cresco, No. 3 (5.2.1)	..	5·15	..	..	..	5·15	10·48	·25	·51	11·24	6·06	11 17 0	,, ,, ,,

Bonedust.	Brand.	Nitrogen.	Phosphoric Acid.	Mechanical Condition.		Price asked per ton.*	Where Obtainable.
				Fine Bone.	Coarse Bone.		
		%	%	%	%	£ s. d.	
Bonedust ..	Apex ..	3·25	20·00	50·0	50·0	8 5 0	North-Eastern Bone Products, Wangaratta
,, ..	Mount Clear ..	3·00	19·00	50·0	50·0	7 15 0	Bailey Bros., 155 Main-road, Ballarat
,, ..	Pannifex's ..	2·50	26·00	50·0	50·0	9 0 0	H. C. Pannifex and Co. Pty. Ltd., 53-57 Munster-terrace, North Melbourne
Bone Flour ..	Fertillo ..	1·00	32·50	95·0	5·0	9 2 6	Glues and By-Products Pty. Ltd., 86 King-street, Melbourne
Bonedust ..	T.B. and S. in diamond Brooklyn	2·50	24·0	50·0	50·0	8 10 0	Thos. Borthwick and Sons Aust. Ltd., 84 William-street, Melbourne
,, ..	T.B. and S. in diamond Portland	2·50	24·00	50·0	50·0	8 10 0	,, ,, ,, ,,
,, ..	VIMA ..	4·50	20·00	55·0	45·0	9 10 0	Victorian Inland Meat Authority, 54 Market-street, Melbourne

* F.O.R. at Melbourne or Railway Station nearest place of manufacture.

Melbourne, 6th December, 1943.

W. R. JEWELL, M.Sc., F.I.C.,
Chemist for Agriculture.

Accredited Brucellosis-free Herds (Swine)

The following herds of pigs have been accredited as free of swine brucellosis (contagious abortion of pigs) by the Department of Agriculture.

An accredited brucellosis-free herd of pigs is one in which all animals therein have been subjected to two successive blood tests for brucellosis with negative results at intervals prescribed by the Chief Veterinary Inspector of the Department.

In order to remain accredited, a semi-annual or annual re-test (as determined by the Chief Veterinary Inspector) of all animals in the herd shall be conducted. If at a re-test any animal fails to give a negative reaction to the test, the herd shall not be declared brucellosis-free again until two tests of the complete herd have been carried out with negative results.

Full particulars of the Accredited Swine Brucellosis-free Herd Scheme and application forms may be obtained from the Chief Veterinary Inspector, Department of Agriculture, Melbourne, C.2.

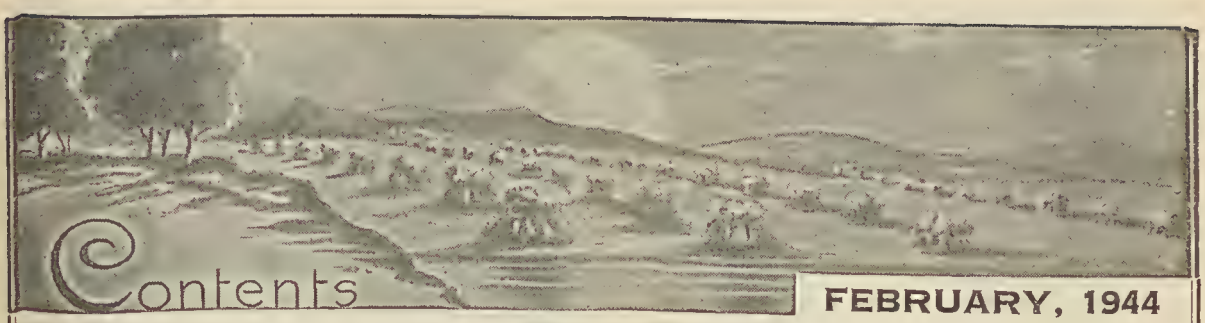
Name.	Address.	Name.	Address.
Abrahams, L. J. ..	Red Hill South	Horn, L. A.	Leongatha North
Beechy, K.	Pomborneit	Longerenong College ..	Dooen
Bidgood Bros.	Staghorn Flat	Noble, T. M., and Sons ..	Maffra
Bodey, A. A.	"Bonnyview," Dooen	Northcote Children's Farm	Bacchus Marsh
Bright, George H. ..	Dumbalk	Pietsch, R. E.	Katyil
Castle, L. H.	Clarinda	Rintoul, J. T. C. ..	Glengarry
Critten, H. S.	Dumbalk	Roy, W. A.	Morrell's Hill, via Boolarra
Dookie Agricultural College	Dookie	State Experiment Farm ..	Rutherglen
Doornbusch, John L. ..	"Starpark," Nhill	Trenery and Soderlund ..	"Promview," Foster
Ellwood, A. H. ..	Paschendaele	Trigg, A. J.	Bungaree
Fairchild and Clutterbuck	Tinamba	Trigg, N. H.	Bullarook
Hamblin, A. T., and Sons	Toolleen	Tweddle, J. T.	"Winlaton," Shepparton
Harrison, C. T... ..	"Eastside" Stud, Pomborneit	Warry, A., and Sons ..	Delburn
Hawtin, I. E. and F. ..	"Rossmoyne," Colac	Whelpton, B.	Whittlesea North
Haywood, Dr. A. R. ..	Hastings	White, G. W.	Boolarra South

Co-ordinated Trials with Phenothiazine against Nematodes in Lambs

Two of the Bureaux, namely those of Animal Health and of Agricultural Parasitology (Helminthology), operating under the Imperial Agricultural Bureaux scheme, have recently collaborated in the production of a 56-page booklet entitled "Joint Publication No. 4—Co-ordinated Trials with phenothiazine against nematodes in lambs". Copies are now available in the United Kingdom (from the Central Sales Branch of the Bureaux, Agricultural Research Building, Penglais, Aberystwyth, Wales) at a cost of 3s. 6d. (stg.) post free. No copies have, as yet, reached Australia.

It was in view of the occurrence of certain discrepancies in the published reports on the use of phenothiazine as an anthelmintic, and the fact that different criteria have been employed by different workers in deciding its efficacy, that the Agricultural Research Council of the United Kingdom decided to institute a series of co-ordinated trials at several centres, so planned as to give results that would be susceptible of adequate statistical analysis and would afford answers to certain specific questions. The Agricultural Research Council has given the report of these trials to the Executive Council of the Imperial Agricultural Bureaux for publication.

Phenothiazine has been tested in single doses against sheep nematodes in trials involving some 280 lambs at different centres in Great Britain, using (*a*) lamb weights, (*b*) egg counts, and (*c*) worm counts as criteria of efficacy. Full details are given of the methods used and it is shown that egg and worm counting techniques are satisfactory.



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Issued by direction of the Hon. N. A. Martin, M.L.A., Minister of Agriculture.

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The Journal is issued monthly. The subscription, which is payable in advance and includes postage, is 3s. per annum for the Commonwealth and New Zealand, and 5s. for the United Kingdom and Foreign Countries. Single copy, Threepence. Subscriptions should be forwarded to the Director of Agriculture, Melbourne, C.2.

POSTAGE RATES

The postage required for this issue is:—To Australia and New Zealand, 1½d. to United Kingdom, 2½d. to United Kingdom via All-sea route, 1½d. to other British Possessions, 2½d. to U.S.A. and Foreign Countries, 3½d.

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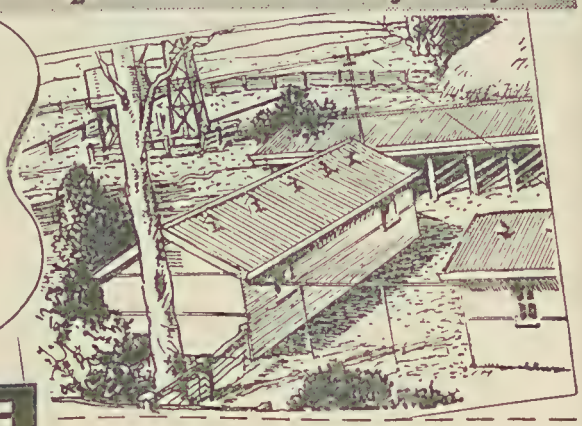

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Wheat Varieties in the Northern District • *Diggora Trials*

By H. C. H. WATSON, Field Officer

A gathering of farmers at a Diggora field day.

THE demands of war have focused popular attention on the production of crops previously grown to a limited extent only in this State, such as flax, blue peas and Navy beans while more commonly grown crops such as potatoes also have increased in significance. These crops are important but it should not be forgotten that cereal crops still play a major part in our war-time agriculture.

According to the Government Statist the average annual value of Victoria's crop production during the past ten years amounts to £16,000,000. Of this amount cereal crops contributed £10,000,000.

Wheat is easily the most important crop in Victoria, but normal production cannot be maintained with the prevailing shortages of manpower, fertilizer and other necessary materials. It is important, however, that the highest possible yields per acre be obtained with the facilities available. The choice of varieties suitable to their district is one factor within the power of farmers to control, and to assist them in this regard the Department of Agriculture conducts wheat variety trials in various wheatgrowing areas of the State. For obvious reasons investigations of late years have been restricted, but every effort has been made to maintain the nucleus of the wheat improvement work at the main experiment stations, and on sites representative of the various soils and climatic conditions.

At Diggora, near Rochester, official wheat experiments commenced in 1941 have been continued, and the results as they become available over a number of seasons will prove of value to wheat-growers in this section of the wheat belt. In 1942 the experimental site was adversely affected by excessive moisture and the germination and subsequent growth were so uneven that the plots were not harvested.

Last year the plots were again sown on the farm of Messrs. J. T. Haines and Son, and included fifteen wheat varieties, and a manurial test with varying dressings of superphosphate. Both experiments were laid out on the replicated system, including four plots of each variety.

The year 1941 was rather dry at Diggora, and the 1943 rainfall was only about half the average annual total of 17 inches, the first six months of the year being particularly dry. For two months after sowing, crops made

very little headway, but fairly favourable spring conditions stimulated growth and moderate yields were obtained.

Included in the variety trial with the standard wheats were a number of promising crossbreds and new varieties recently bred by the Department. The plots were sown on 26th May, with 70 lb. of seed and 30 lb. of superphosphate per acre.

Last year's results and the average returns for two years are shown in Table I.

TABLE I.—WHEAT VARIETY TRIALS. DIGGORA (NORTHERN DISTRICT).

Variety.	1943.	Average Two Years, 1941–43.
	Bushels per Acre.	Bushels per Acre.
Quadrat	19·8	20·3
Ghurka × C.M.G. (W 5537) ..	19·5	20·4
Magnet	19·4	19·4
Ghurka × Ranee (M 6173) ..	19·4	..
Wannon × Ghurka (L 6031) ..	18·7	20·8
Pindar	18·5	19·6
Ghurka × Pusa 4 (M 4510) ..	18·4	..
Dundee	18·2	19·0
Bencubbin	17·5	19·8
Bobin	17·0	19·0
Ghurka × W. Fife (L 5266) ..	16·7	19·0
Ranee 4H	16·7	18·2
Regalia	16·7	17·4
Baldmin	16·0	16·2
Ghurka	15·6	17·0

With results available for two seasons only it is not possible to make final recommendations regarding the newer wheats, but it is of interest to note that the recently named varieties, Quadrat, Magnet and Pindar were amongst the best yielders in the trials. Several of the new crossbreds have also given good returns and their future behaviour in regard to yield, field characteristics and flour quality will be watched with interest.

The former standard wheats for the district, Ghurka, Ranee 4H, and Dundee have given somewhat lower yields, but in view of their proved ability over a number of years and the peculiar seasonal conditions experienced in the limited period of this trial, it would be somewhat risky to discard them completely. Nevertheless, Quadrat, Pindar and Magnet have good records in other districts also, and are now confidently recommended.

Included in the tests for the first time last year were two new crossbreds, both of which yielded well. The Ghurka by Ranee cross, an early variety, has been giving good returns in various trials in the Mallee and consideration is being given to its release to farmers in that district as a general purpose wheat. The objective of the other new cross, Ghurka by Pusa 4, is to combine the yielding ability of Ghurka with the superior flour quality of Pusa 4, and further tests over varying seasons will be undertaken with this variety.

Manurial Trials

A marked response to superphosphate was again obtained last year. The soils of the Northern district require superphosphate as much as, if not more than, any other wheat-growing area in Victoria. The low dressing of superphosphate at the rate of 30 lb. per acre was included to demonstrate the effect of reduced applications of manure and resulted in an increased yield of five bushels per acre as compared with the plots not manured at all.

Sown with Ghurka at 70 lb. seed per acre, the detailed yields and average results for two years are set out in Table II.

TABLE II.—WHEAT MANURIAL TRIALS. DIGGORA.

Manurial Treatment per Acre.	Yield, 1943.	Increase Due to Super.	Average Two Years 1941–43.	
			Average Yield.	Increase Due to Super.
	Bushels per Acre.	Bushels per Acre.	Bushels per Acre.	Bushels per Acre.
No manure ..	9·8	..	9·5	..
Super., 30 lb. ..	14·8	5·0	..	..
Super., 60 lb. ..	17·2	7·4	17·3	7·8
Super., 90 lb. ..	19·8	10·0	20·3	10·8
Super., 120 lb. ..	20·8	11·0	21·4	11·9
Super., 150 lb. ..	22·8	13·0	23·4	13·9

The results show how essential are liberal dressings of superphosphate for wheat sown on fallowed land in this district, and are in keeping with similar tests at other centres in the northern wheat areas. The optimum dressing is in the region of 1 cwt. per acre, but with the present acute shortage of fertilizer farmers will be forced to use the minimum dressing possible or even to sow some of the area without manure. Available stocks can best be used by reducing the normal rate per acre over the whole of the fallowed area sown, rather than by sowing part with a medium quantity of superphosphate and the balance without fertilizer.

PRODUCTION OF POULTRY FOR THE TABLE

By H. F. CLINTON, Poultry Expert

The Rhode Island Red is an excellent table breed.

WITH the advent of meat rationing, consumers in Australia are faced with the task of adjusting their diet, at least insofar as meat is concerned, to the quantities they will be able to purchase under the coupon scale. For many rationing means a fairly considerable reduction in the amount of meat eaten, and naturally people will turn to unrationed foods to make up any deficiency. Poultry will be one of the first choices, and there can be little doubt that, to supplement their meat ration, Australian consumers will look more to poultry than they have in the past.

Whether the poultry industry will be able to meet the demand likely to arise in the near future is doubtful, but there can be no doubt that individual producers and farmers who run a few poultry mainly as a side line, and even the back-yard poultry-farmer, may do quite a lot towards increasing the supply and at the same time supplementing their incomes. For the benefit of those who have had little or no experience in the raising of table birds, the following article has been prepared.

Quality in table poultry is primarily a matter of breeding, feeding, and care. The production of the highest class of table birds depends upon the selection of breeds which will mature rapidly and respond well to the fattening process.

Any variation in flavour is due to feeding, preparation, and marketing, rather than to any difference in breed. Palatability and quality of the flesh are the most practical and important considerations; colour of skin, legs, and feathers are considerations of prejudice. A plump-breasted table bird of good quality naturally will have a better flavour than will a poor bird, but it should be remembered that there are often differences in constitutional vigour even amongst birds of the same breed.

In Victoria there is comparatively little specialization in table poultry production, as egg production has been the most profitable branch of poultry keeping when birds are reared in large numbers. The most highly developed breeds for egg production are White Leghorns and Australorps. The White Leghorn belongs to the Light Breed group, and

Poor quality birds, such as these, are not wanted by the buyer.

though it is by no means an ideal bird for the table, large numbers are sold locally for that purpose. The cockerels are seldom up to the desired standard when marketed, though with careful attention and feeding they could be greatly improved. In view of the high prices being realized for table poultry and which should be maintained while rationing continues, it would pay the poultry farmer to keep cockerels after sexing and top them off for this class of trade. If this cannot be done the young cockerels should be disposed of to institutions and others who require them.

The Australorp belongs to the Heavy Breed. It is classed as a dual-purpose variety, i.e., a good layer, and also one suitable for the table, but as a table bird it is not considered to be equal to some of the other heavy breeds which have been specially developed for that purpose. The quality of the cockerels usually marketed also leaves room for improvement.

The table birds mostly favoured in England are the best heavy breeds, possessing white skin and legs, such as the Sussex, Buff Orpington and others, some of which are not readily obtainable here, or a cross produced by mating an Indian Game male with Buff Orpington females or other heavy breeds. In some parts of the world, and to a very large extent in Victoria, breeds other than those with white skin and legs are equally in demand, such as Rhode Island Reds, Rhode Island Whites, Plymouth Rocks, &c. In England, sex-linked breeds are being increasingly used, a popular cross possessing this character is the Rhode Island Red male with Light Sussex females; the male chickens carry the plumage of the Light Sussex, and therefore may be separated from the females at the time of hatching. There are many good flocks of Rhode Island Reds in Victoria, and the production of table poultry from this breed and its crosses is recommended.

There is a keen demand for birds in a good finished condition, with flesh of a good quality and white in colour, abundance of breast meat and fine in bone. The production of birds of this class requires considerable experience. With most heavy birds the feeding of highly fattening foods for a limited time improves the colour of the flesh greatly, especially if the foods are white.

In the early stages, the rearing and feeding of the chickens may be the same as that usually adopted with those intended for egg production, except that a little higher proportion of dried butter-milk or meat-meal could, with advantage, be included in the ration, in order to make their growth as rapid as possible.

Finally, at a suitable age, it is usual to give the birds a short period of intensive fattening. For this purpose they should be confined to small pens or fattening coops for about two weeks, and trough-fed twice daily on wet mash only (no grit is required). Where specialized poultry production is profitable the following ration mixed with water to the consistency of thick porridge is advocated:—

	lb.
Dried milk (skim milk or butter-milk)	5
Meat-meal	5
Ground wheat or barley ..	30
Ground maize	30
Ground oats (good quality only)	30
	100

Birds in this condition are always in demand.

When ground maize and dried milk are expensive or unprocurable, a ration made by mixing 5 lb. of meat-meal, 75 lb. of ground wheat or barley, and 20 lb. of ground oats gives very good results.

Liquid milk may be used in place of the dried product or meat-meal. Approximately 1 lb. of dried milk or meat-meal is equivalent to 1 gallon of separated milk (10 lb.).

A cheaply constructed fattening coop.

The fattening coops can be built 7 ft. 6 in. long, 20 inches broad, and 20 inches high, and may be divided into three compartments, each of which will accommodate five or six birds, or fifteen to eighteen birds in all. Light battens may be used 1½ inches apart, except in front, where they should be 2½ inches apart, so that the birds can easily put out their heads for feeding from the trough, which is placed just outside. The bottom bars on which the birds stand can be made with specially cut wood, 1 inch wide at the top, 1 inch in depth, narrowing to half an inch below, so that the droppings will fall through without catching on the sides, as would happen if the bars were perfectly square. Alternately, a wire-netting floor can be put in. The coops should be placed in a sheltered position, so as to keep the birds warm. Quietness and freedom from excitement are essential for rapid fattening.

The rearing of White Leghorn cockerels in battery brooders is becoming popular in Victoria. Under this system, dry mash only (with water) is kept constantly before the birds.

The age at which birds classed as chickens are marketed usually varies from about three to five months, depending upon the class of trade for which they are intended and the time of the year when they are in greatest demand.

Producers may market their poultry alive to merchants, or sell it dressed direct to the consumer. Exporters prefer to buy live poultry, as the process of dressing, packing, and shipping has developed into a specialized industry, and few producers have a sufficient number of birds to justify the expense of installing elaborate equipment for killing, dressing, chilling, and packing.

Ducks

Ducks, too, can be raised with success on mixed farms, but they are not so well adapted as fowls to supply the major source of income, and careful consideration should be given before attempting to run ducks on a large scale. When kept in small numbers, ducks serve to add variety to the meat and eggs for the owner's table.

In Victoria ducks are kept chiefly for table purposes, although quite a number of small flocks are kept for egg production. Those suitable for table purposes are the heavy breeds, such as the Aylesbury, Pekin, Aylesbury and Pekin cross, and Muscovy. Muscovy ducks have very deservedly acquired a reputation for table purposes. In Victoria they are kept to a much larger extent than any other breed, and are good sitters and careful mothers. They have a quiet temperament, and do not run about much, or lose condition by excessive exercise.

A suitable site for keeping ducks is on well drained land, preferably with a light or sandy soil, which is conducive to the cleanliness of the birds and sweetness of the ground. There should be sufficient land for the growth of green food. Shade is essential, and the birds should be protected from cold winds.

Houses for ducks should have sufficient ventilation, dry floors, and protection from prevailing winds. They may be built similar in design to ordinary poultry houses. We suggest a lean-to building, facing north or north-east when possible so that the floors may receive as much sun as possible, open fronted, and with a ventilation space at the top of the back wall which can be closed by means of a hinged board during unsuitable weather. With an outside run provided, the size of the house may be estimated by allowing 2 to 3 square feet of floor space for each duck. It is essential that the birds should be kept warm and comfortable at night by covering the floor with clean straw, sand, or other dry material.

The Muscovy has acquired an excellent reputation as a table bird.

The strongest ducklings are produced from eggs of well matured, strong, vigorous stock. With heavy breeds like the Muscovy, one drake can be mated to about three to five ducks, which should be kept in separate breeding pens. With this breed it is usual for breeding operations to be continued throughout the year.

At the commencement, a good chick mixture, formed into a moist mash, has given satisfactory results for feeding ducklings. In addition, ducklings should be given an ample supply of chaffed fresh green food daily. The young birds are usually fed all that they will eat four times daily, until they are two to three weeks old, and then three times daily until well grown. At four or five weeks of age, they may be fed a similar ration to the mature ducks. A suitable mixture is—

	lb.
Ground wheat or barley	35
Ground oats	35
Bran	20
Meat-meal	10

Not less than 25 per cent. of chaffed tender green food should be added. Skim milk or boiled fresh meat may be used to replace meat-meal. The meat may consist of various carcasses, bullocks heads, livers, &c., and the soup from these mixed with the mash. The mash should be fed morning and evening.

Clean drinking water must be kept continually before the birds, and it should be placed in deep drinking vessels. If ducks are allowed to go without drinking water even for a brief period, they are likely to become overheated and when watered, drink to excess. This may cause sickness or even death from cramp. Shell grit should be kept continually before the birds.

Turkeys

The feeding of turkeys differs slightly from the feeding of fowls. As with chickens, the young turkeys should be allowed free range in fine sunny weather.

The first feed may consist of a good chick mixture, which can be given as a dry or wet mash. The usual custom is to have a dry mash always available, and to feed a wet mash twice a day. At the end of three weeks, the wet mash can be fed once a day. After the birds are a few days old, a little finely chopped tender green food should be added to the wet mash, and some may be fed separately.

Skim milk may be used in mixing the mash, and also for drinking purposes. A little cracked grain should also be fed in the evenings, and at the end of six weeks whole wheat and oats, with cracked maize if available, should be given. It is important that an adequate supply of fresh green food, shell grit, and clean drinking water should always be available for the birds.

[*Continued on page* 58.

The Caponizing of Cockerels

By W. D. SHEW, G.M.V.C., B.V.Sc., Senior Veterinary Officer

THE fattening of table poultry as a special line has never become fully developed in Australia, although the introduction of meat rationing will undoubtedly encourage poultry farmers and others to take a greater interest in this branch of poultry raising.

Apart from housing and feeding of table poultry and the best breeds to keep, subjects dealt with elsewhere in this issue, an excellent table bird can be produced by the caponizing or emasculation of cockerels.

The advantages of caponizing are that the operation develops a bird of good growth and one of high table quality. Capons can be run with the flock at small cost and with no disturbance to the laying flock. Capons also grow faster and at less feeding cost per lb. to fatten than sexed poultry.

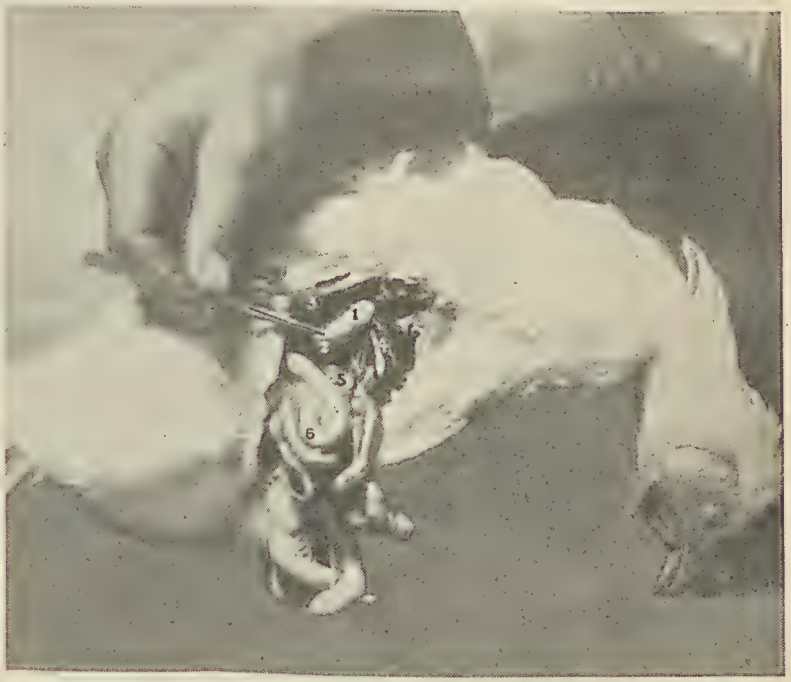


Fig. I—Abdominal contents exposed in a dead bird showing upper testicle in spoon. (1) Upper testicle. (2) Lower testicle. (3) Kidney. (4) Liver. (5) Gizzard. (6) Bowels.

How to Perform the Operation

Select cockerels from two to four months of age—the younger the better. Cockerels awaiting operation should be penned up and allowed neither food nor water for at least 24 hours prior to operation. It is a good practice to pen them up first thing in the morning before feeding and to delay the operation until noon on the following day. As a maximum amount of light is essential for the operation it is preferable to do the work in bright sunny weather.

The learner is advised to hold post-mortem examinations on as many dead birds as possible prior to undertaking the operation in order to become thoroughly familiar with the anatomy of a cockerel.

The relative position of the organs is shown in Fig. 1. The necessary instruments, as set out in Fig. 2, can be purchased at moderate cost either in sets or singly at an instrument makers.

A table specially prepared for the purpose should be set aside for the operation if many birds are to be done, and it should have two holes bored in the top through which a weighted cord is passed to secure the wings and legs. It is a good plan also to have the table of a height to suit the operator.

All instruments must be sterilized by boiling before use, and during the operation when not actually in use should be kept in a dish containing a 1 per cent. solution of dettol, lysol, or similar antiseptic, in warm water.

To commence the operation remove a few feathers in front of the thigh and feel the position of the last two ribs. Push the skin towards the hip, and incise the skin between these ribs; the skin should be dabbed with a little methylated spirits before the incision is made. Pushing the skin before cutting allows it to cover the flesh wound when it returns to position after removal of the testicles. The flesh beneath is

now exposed, and a band of flesh may be seen just overlying the last two ribs running up and down; it will prevent bleeding if this can be pushed back towards the thigh. Then cut the flesh between the last two ribs; the incision should be about an inch in length, and the muscle only should be incised. The spreader (see Fig. 2) must now be inserted; on looking into the opening a glistening membrane will be seen overlying the bowel. Carefully perforate this membrane with a hook or forceps, taking care not to injure the organs beneath. The abdominal contents will now be seen and the upper testicle up under the back should be plainly visible.

It may be necessary to enlarge the opening between the ribs. The bowel is readily distinguished by its darker colour, whereas the testicle is yellow, and of fleshy consistence. The size of the testicle varies greatly in different breeds at different ages, and is closely associated with the development of comb. It is preferable to remove the lower testicle first, and then any bleeding will not mask the view. Carefully push the bowel aside with the instrument provided so as to reveal the lower testicle. Different instruments are used for removing the organ—a handy one is the spoon type, as shown. It is preferable to have two of these, of different sizes. Insert the spoon and work it so that it engages the lower testicle with the cord of the organ in the slit of the spoon. Take care no bowel is entangled. Now carefully twist the spoon so that the testicle and its enveloping coat comes away freely. Repeat the same performance with the upper testicle. If any difficulty is experienced in removing the lower one, it is quicker to cover the wound, turn the bird over, and repeat the operation on the other side. Care should be taken to see that no feathers enter the wound, and that the whole of each testicle is removed. It is neither necessary nor desirable to sew up the wound. The only danger in the operation is injury to the large blood vessels under the backbone.

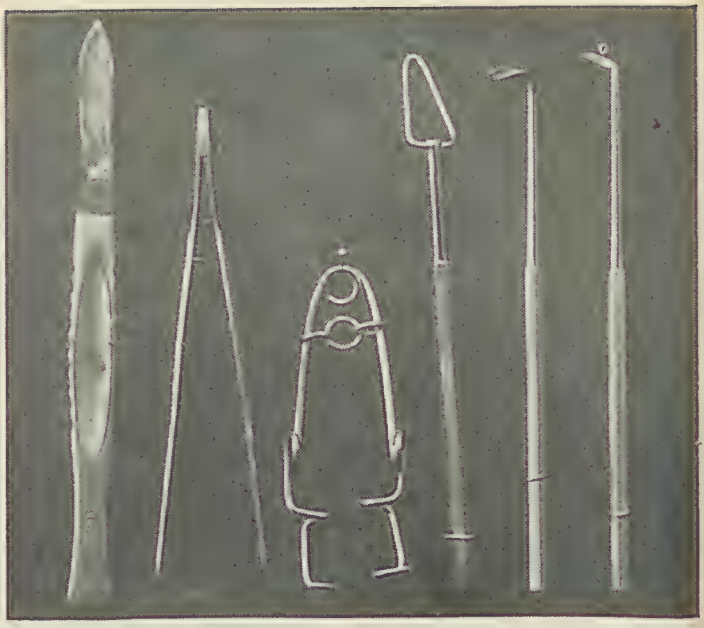


Fig. 2—Caponizing instruments. (1) Knife. (2) Forceps (3) Spreader. (4) Instrument to push bowel aside. (5) Spoon. (6) Instrument for opening membrane over bowels.

If these are injured, profuse bleeding will occur and death will rapidly ensue. A little care in removing the testicles will, however, prevent this. Once the skin is opened, there is but little pain in the operation. The time occupied, when the necessary dexterity is obtained, need be only a few minutes, and the bird can be immediately released to recommence feeding. As a rule no after-attention is required, although it occasionally happens that the skin, acting as a pump and valve, sucks in air, and "balloons" up. This can be pressed out through the skin wound or perforated with a needle.

Marked changes in the temperament of the birds occur as a result of this operation. They become quieter, the combs begin to shrivel up, and they often develop habits akin to those of the hen, such as rearing chickens. A few months ago on a farm near Melbourne a number of capons were noticed, each "clucking" away with a fine batch of chickens.

Capons, as a rule, only become broody after a clutch of chickens has been placed under them; they then rise to the occasion and make good "mothers."

Don't start something you can't stop! Particularly Bush Fires!

THE POTATO MOTH

By R. T. M. PESCOTT, M.Agr.Sc., Entomologist

The potato moth this season has already inflicted considerable damage on the early potato crops, and growers are urged to take all steps possible to control this pest.

THE Potato Moth (*Phthorimaea operculella* Zell) is an introduced pest which is present, to a more or less extent, in every potato-growing district in this State. In hot dry seasons losses from this insect may be very severe, damage of up to 60 per cent. occurring in early crops and from 25 to 40 per cent. in mid-season and late crops.

Host Plants.

In addition to potatoes, the potato moth is known to attack such crops as tobacco and tomatoes, and in addition, such weeds as nightshade, thorn apple, and henbane.

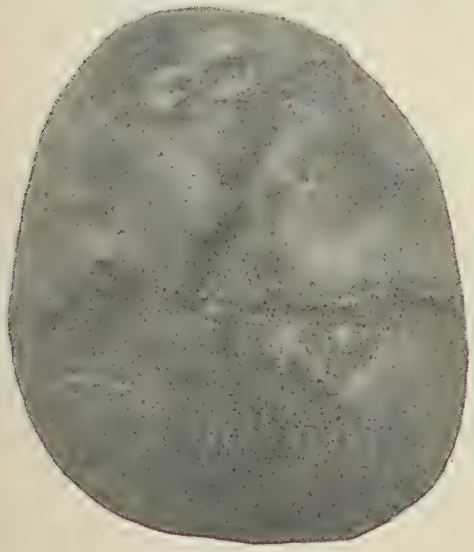
Injury

The potato moth causes two distinct forms of injury to the potato crop—(i) to the growing plant, and (ii) to the tubers. The injury to the growing plant occurs usually early in the season, when the grubs feed on the leaves, forming small brown blotches there, and also tunnelling in the stems. Where this type of damage occurs, generally over a field while the potato plants are young, considerable injury may result to the crop through a general weakening of the plants.

Leaves and stems of potato plants affected by potato moth. [*U.S.D.A. Bull.* 427.

The injury to the tubers may occur in the field if they become exposed while growing, or if they are allowed to remain in the field for any length of time after digging. Serious infestation of the tubers may also occur after they have been stored in a shed, bin, or stack. In storage, the potato moth may continue to reproduce as long as the potatoes contain enough food to mature the grubs.

Where tubers are infested in storage, the point of infestation is usually at the eyes, where the eggs are laid. The market value of such potatoes is considerably reduced and, in addition, seriously affected tubers are not recommended for seed purposes. There are upwards of five or six broods of potato moths in one complete season.



Tuber damage done by potato moth grubs.

A potato crop well moulded.

2. Prepare the soil thoroughly so that efficient cultivations and mouldings can be given later.

3. Plant deeply (at least four inches), cultivate thoroughly and give a heavy moulding so that the minimum number of tubers become exposed.

4. After digging, bag the potatoes as soon as possible. Do not cover the open mouth of the bag with potato tops, but sew the bags at once and, preferably, turn them upside-down.

5. Remove the bagged potatoes from the field as soon as possible after digging.

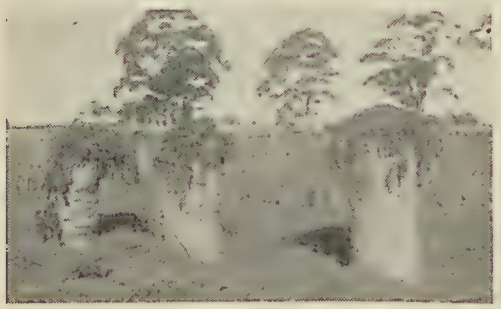
6. Collect and burn all potato tops after digging, preferably every day.

7. Destroy all weeds that may serve as host plants for the potato moth.

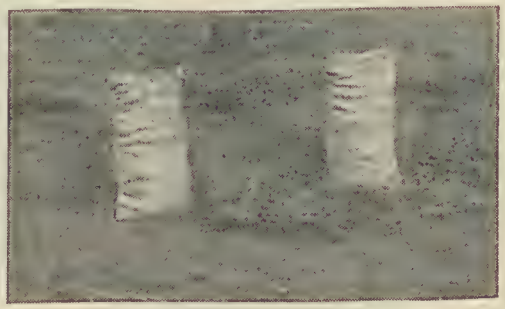
Control

The control measures suggested for this pest may be summarized as follows:—

1. It is undesirable to plant seed infested with potato moth.



Bagged potatoes covered with potato tops—a bad practice.



Bagged potatoes sewn at once and inverted—a good practice.

Journal of Agriculture, Index for 1943

Copies of the Index of the *Journal of Agriculture* have now been printed, and may be obtained, post free, on application to the Stores Branch, Department of Agriculture, Melbourne, C.2.

PRODUCTION OF TABLE POULTRY—*continued from page 54.*

When the turkeys are allowed out on free range, with plenty of grass seeds and insect life available, the mash may be eliminated and only a grain feed given in the evening to encourage the birds to come back to the roosting quarters, and also to supply any additional food that may be required.

Give the birds extra food for three or four weeks before marketing, to ensure that they are in prime condition.

The Werribee Poultry Studs

Some of the Breeding Methods Used

By W. O. PEDERICK, Assistant Poultry Expert

Poultry breeding pens at the State Research Farm, Werribee.

BIRDS of the White Leghorn stud at the State Research Farm, Werribee, can be traced back to original stock purchased for the Experimental Farm at Wyuna in 1913, and the Australorps to 1920 when the stud was established at Werribee.

By applying a system of testing, recording, and selection, every endeavour has been made to build up a strain of birds possessing a combination of characters essential to successful poultry farming—namely breed type, high egg production, constitutional vigour, size of egg, fertility and hatching qualities of eggs, and "rearability" of chickens.

Records of the above characters have been kept for many years and are referred to when stud birds are selected each year.

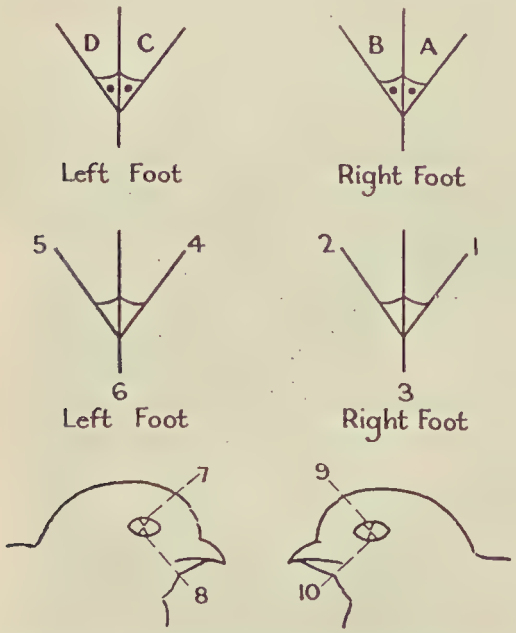
Eighty-eight pullets of each breed are single-tested annually, a few pullets being tested from each mating to ascertain the best individuals and the most consistent families or strains. This latter information is particularly valuable because it is considered that family characters more than individual characters are likely to be passed on to the progeny.

Twenty-four of the best of the tested birds of each breed are single-mated in the following breeding season to males which also have been bred from single matings. Eggs from these single-mated hens are hatched in special pedigree trays, and the chickens are so branded that when they are taken from the trays their identity is retained. In fact *every* chicken hatched on the farm is so branded that its pedigree can be traced.

In addition to the single matings there are the pen or group matings in which a male from a single mating is mated to a group of hens specially selected on their breeding and relationship from hens which have proved outstanding in the single testing pens. These pen matings are necessary because it is not possible to single-test and single-mate every bird. As far

as possible the hens mated in each pen are full sisters. A number of the progeny of these pen matings are single-tested each year and the high producers are single-mated the following year.

Cockerels bred from the single matings are used for stud purposes on the farm, and these, together with cockerels from pen matings are available also to poultry farmers and general farmers throughout the State for flock improvement. This distribution of pedigreed stock from proved strains has been responsible for a considerable increase in flock production averages throughout the State.



System of marking for the Identification of chickens.

The system of breeding used at Werribee has also raised egg production on the farm. In the feed-test pens, where approximately 500 pullets are kept under commercial conditions each year and their production carefully recorded, a considerable improvement has been noticed. During the first three years of flock-recording commencing in 1921, the average production per bird for each year was 164 eggs. During the three years commencing 1938, the average was raised to 191 eggs—an increase of 27 eggs per bird each year. This increase in production would make a difference in the returns of a poultry keeper with 1,000 laying hens, of approximately £125 per year, or £2 8s. per week.

Some of the highest individual scores recorded at Werribee are given hereunder:—

White Leghorns—335, 333, 327, 313, 306, and 305.

Australorps—340, 330, 329, 318, 307, and 300.

Pullets from these high-scoring hens, however, have seldom been such prolific layers. The main value of these outstanding layers has been in the breeding of cockerels through which the high-producing capacity has been

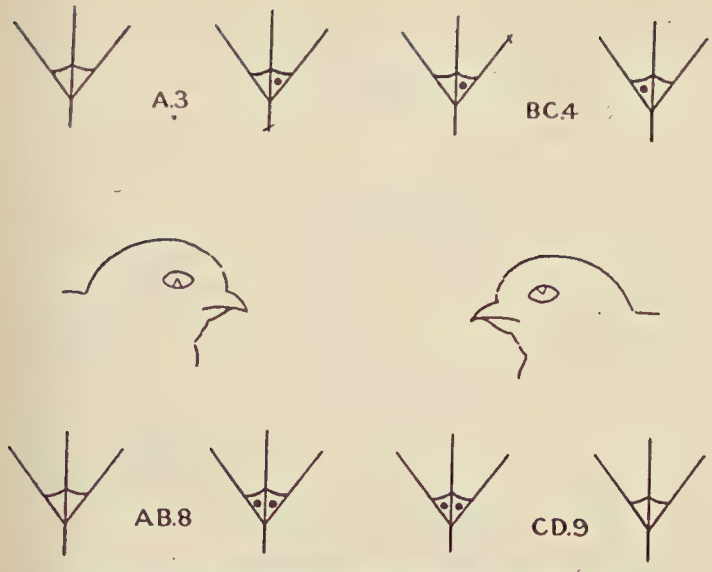
RECORD OF FERTILITY, "HATCHABILITY" AND "REARABILITY."

Bird Number. (Egg Production in Brackets)	Date Eggs Set.	Number of Eggs Set.	Infertile Eggs.	Number of Chicks Hatched.	Number of Chicks Dead in First Six Weeks.	Number of Chicks Taken from Brooder House.
11BD (252)	Sept. 2 ..	6	1	5	..	..
	„ 9 ..	5	..	4	..	..
	„ 16 ..	5	..	5	..	..
	„ 30 ..	5	..	4	..	..
	Oct. 7 ..	5	..	5	..	..
Totals	.. ..	26	1	23	3	20

The record of hen 11BD is a good one as 20 chickens were reared from 26 eggs laid.

167AB 7 (261)	Sept. 2 ..	5	..	3	..	..
	„ 9 ..	5	1	2	..	..
	„ 16 ..	5	2	2	..	..
Totals	.. ..	15	3	7	2	5

In this test only 5 chicks were reared from 15 eggs laid.



The diagram shows how the marking system operates.

transmitted to their grand-daughters. For example, hen No. 73 laid 333 eggs. A son, mated to a hen which laid 261 eggs, produced five sisters with the scores 335, 303, 297, 276, and 271, an average of 296 eggs per bird.

A pedigree of three hens, full sisters, which were single-mated in 1940, is given on page 63. The numbers shown in the pedigree chart are the birds' stud numbers, the letters and number are their brands, and the numbers in brackets represent each hen's egg score for her pullet year.

A pedigree of the male No. 308–A7 (marked with an asterisk in the topright-hand corner) is set out on page 62, the two charts providing a record of twelve generations, covering more than twenty years.

In a full pedigree of twelve generations, there are 4,095 individual birds and, as characters from any one of those birds may be inherited, some appreciation of the problems of the stud breeder may be obtained.

A careful study of the charts will show that many of the birds are closely bred, but careful selection and reference to the records of performance have enabled stamina as well as production to be maintained.

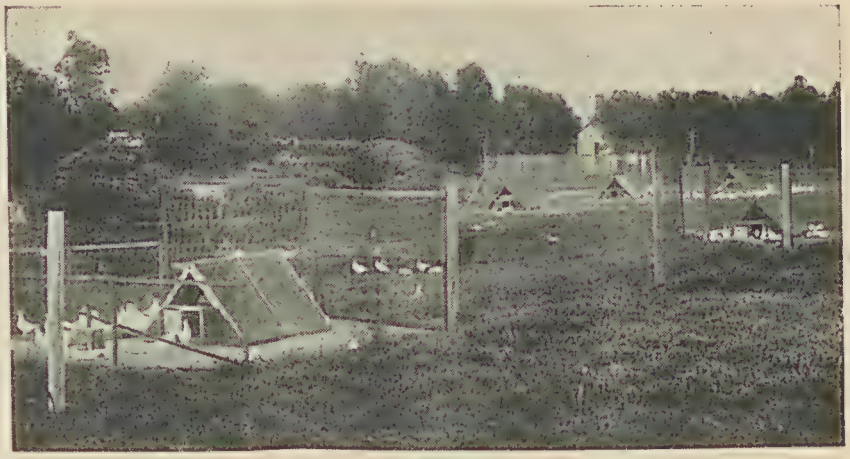
The records of two high producing hens are set out in the tables on the previous page. They illustrate that high egg production is not the only quality to look for in a good stud bird.

System of Branding Chicks Used at Werribee

The punch marks, which are made by piercing the web of skin between the toes with a hot needle, are lettered from right to left ABCD.

Fifteen different brands are available A, B, C, D, AB, AC, AD, BC, BD, CD, ABC, ABD, BCD, ACD, ABCD.

The toes may also be marked by cutting off the claw or nail and searing it to prevent bleeding.



Chick rearing under the Colony system at Werribee.

The centre toe, which is the main scratching toe, is not touched. The toe marks are numbered from right to left; No's. 3 and 6 are the hind toes on each foot.

By using the toe marks in conjunction with the web marks, a great number of brands are available.

In branding chicks from single matings the web marks or letters indicate the sire and the toe marks or numbers indicate the dam.

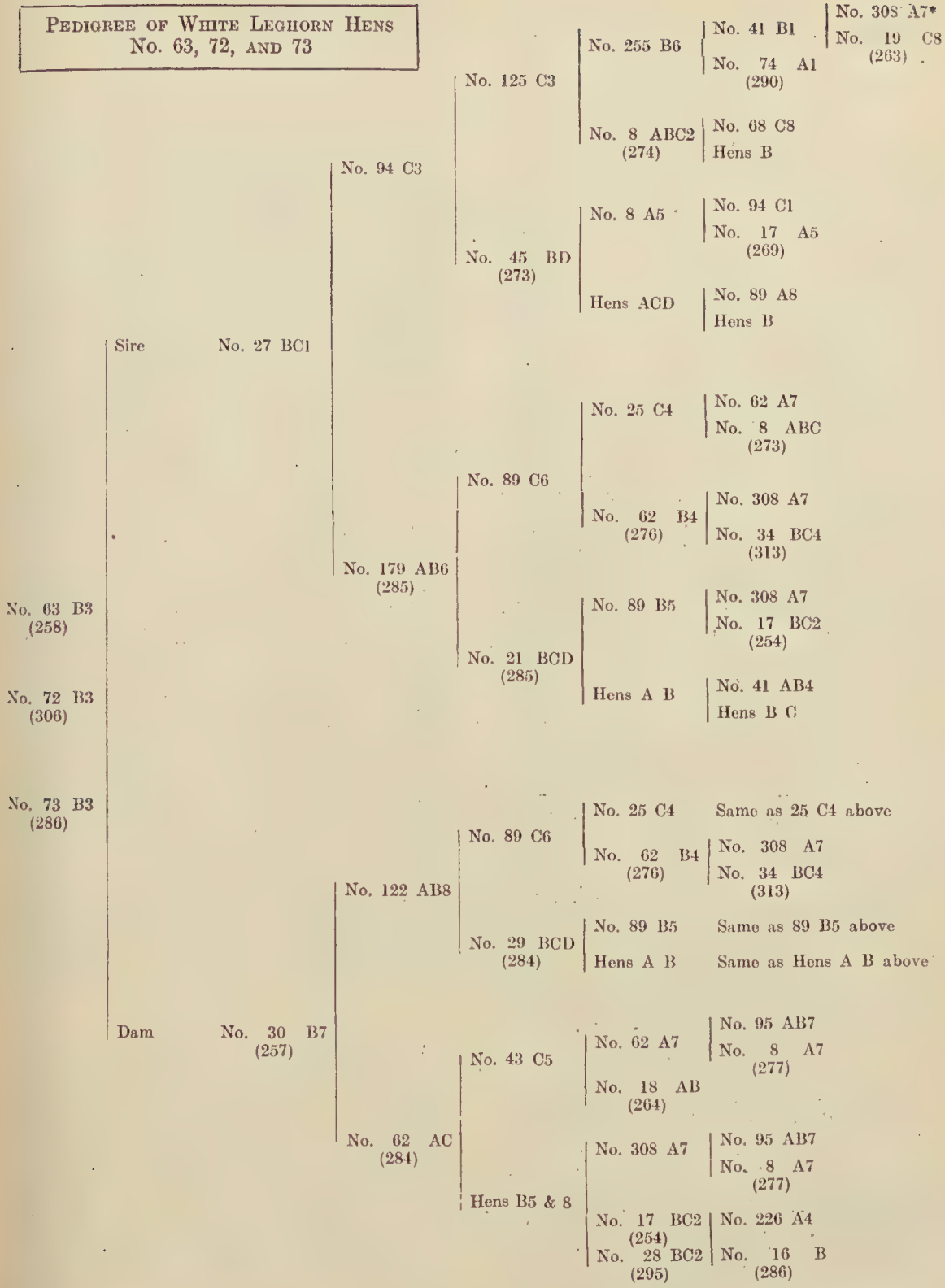
When more than six hens are single-mated to one male, the additional numbers are obtained by eye-marking—a small nick is cut in the different eye-lids.

These eye marks are numbered as shown in the line drawings.

Pedigree of White Leghorn Male No. 308

- **No.308 A7**
  - **Sire** No. 95 AB7
    - No. 1 A7
      - No. 233 Fresh blood.
      - No. 109 B4 (335)
        - No. 210 CD6
          - No. 90 BD
          - No. 73 ABC6 (333)
        - No. 44 AD (261)
          - No. 50
          - Hens bred from 285 hen
    - No. 22 AB4 (285)
      - No. 210 CD6
        - No. 90 BD
        - No. 73 ABC6 (333)
          - No. 105 Fresh blood
          - Hens D (242-260)
      - No. 111 B8 (256)
        - C 5
          - No. 81 Fresh blood
          - No. 31 AC
        - No. 100 ABC
          - No. 105 Fresh blood
          - Hens D (242-260)
  - **Dam** No. 8 A7 (277)
    - No. 233 Fresh blood
    - No. 169 B4 (335)
      - No. 210 CD6
        - No. 90 BD
          - No. 25 AC
          - Hens AD
        - No. 73 ABC 6 (333)
          - No. 105 Fresh blood
          - Hens D (242-260)
      - No. 44 AD (261)
        - No. 50 Son of Lady Ormond (301 Burnley)
        - Hens bred from 285 hen

Pedigree of White Leghorn Hens No. 63, 72, and 73



War Agricultural Committee Notes

Compiled by THE CENTRAL EXECUTIVE

Manpower Problems

WITH our limited population, the decision as to the way in which our manpower should be used is a very important one. Production, whether of munitions or foodstuffs, guns or butter, must be measured in terms of available manpower, and it is vital that every endeavour should be made to ensure that everyone is being used to the maximum of his capacity.

During the early part of the war, manpower for the Services and the making of munitions was of major importance and farmers and rural workers responded to the call for men and women. In the last two years, however, the position has changed, and Australia is now faced with the need for production of food for our own and the Allied Services and for export to Great Britain. Where manpower was once needed more urgently for our Armies, now it is necessary to build up our primary production to meet the greatly increased food production programme which is to be one of Australia's contributions to the war effort.

The War Agricultural Committees have been asked to play a big part in this programme, not only in providing the Manpower Directorate with the necessary statistics of numbers required but also in assisting to place the men available to the best use. Their work in this direction has been along three main lines:—

(*a*) Obtaining from farmers their needs of permanent and casual labour so that the position may be placed before the authorities.

(*b*) Advising the Manpower Directorate on specific cases of call-up or application for release from the Services or Munitions.

(*c*) The organizing of voluntary or part-time workers for special harvest or other needs.

In all cases the ultimate responsibility for provision and use of available labour rests with the Manpower Directorate, and the War Agricultural Committees act as advisory authorities only in this connexion.

Surveys of Manpower Requirements

Where large numbers of workers are required for seasonal purposes, extensive surveys of manpower requirements have been undertaken by the War Agricultural Committees. This has necessitated the interview of farmers individually to ascertain their requirements. In some instances, the farmers' associations have helped in this task by sending circulars to their members. It is also the responsibility of the Committees to ensure that adequate accommodation of a suitable nature is available for the men directed to farmers by the Manpower Directorate, and this forms a very important part in any survey of requirements.

Such a survey must be undertaken early and the estimates forwarded to the Manpower Directorate about two months before the men are required, in order that there will be sufficient time to find the required workers.

In the Goulburn Valley, the Mildura irrigation settlement and the Swan Hill-Nyah-Woorinen district, extensive surveys have been undertaken by the War Agricultural Committees to ascertain the number of men required for fruit picking. Accommodation for the men was inspected and arrangements made to see that no worker was without adequate shelter. Though many small difficulties were encountered the successful gathering of the harvest is an indication that this work was well done.

The potato-growing districts of Ballarat and Gippsland presented similar difficulties with regard to potato diggers. In this case a survey of diggers required was necessary in order that the men could be directed from one district to another as the season progressed.

Releases from Service

One of the most recent activities of the War Agricultural Committees was in connexion with the release of men from essential industry and the Army to engage in primary production. The Army has agreed to release 15,000 men during a twelve-month period.

Full publicity has been given to the procedure to be adopted by farmers requiring men, and over 3,000 applications have already been received by Victorian Local War Agricultural

Committees. The Local Committee investigates each application to ascertain whether production on the farm will be maintained or increased by the additional help given by the man to be released. The Local Committee's report is then forwarded for consideration and recommendation by the Manpower Authorities to the Army.

The investigating of these applications has thrown a considerable amount of extra work on to members of Local War Agricultural Committees, who are themselves farmers and can spare only a limited amount of time on matters such as this. However, little time is lost at this stage, as it is the Committee's policy to deal with farmers' applications as quickly as possible. Up to the middle of January approximately 860 men had been released from the Army in Victoria under this scheme.

Farmers are relying to a considerable degree on this source of permanent manpower for increased production on their farms. The War Agricultural Committee Executive will subsequently report to the Manpower Directorate on the results of these releases.

Pool of Rural Labour

A criticism frequently voiced is that the existing labour on farms is not being used to its fullest capacity. It is generally recognized that most farmers have a short period each year when work is not pressing and during which employees might be used in other districts. In this regard it is interesting to note that during the fruit harvest of 1942-43 the Mallee and Wimmera districts alone provided over 1,000 men for fruit picking after the cereal harvest had been gathered.

A State-wide survey was accordingly undertaken by the National Service Officers and War Agricultural Committees to classify rural workers into one of the folowing categories:—

(*a*) Required full time on the farm on which he is now working.

(*b*) Available for certain periods during the year for seasonal work elsewhere.

(*c*) Available full time for work elsewhere.

The men falling within categories (*b*) and (*c*) form a "Pool of Rural Labour" which may be drawn upon to meet the labour requirements of war-time food production, especially with regard to seasonal work.

The scope of the survey included all single men up to the age of 45 years and all married men within Military Classes 1 and 2. Arrangements were made for each man to be interviewed by a body consisting of the National Service Officer, the Chairman of the District War Agricultural Committee and Local War Agricultural Committee members. Details of the farm on which the individual was employed and of the work done by him, together with the personal knowledge of the War Agricultural Committee members, provided the basis on which the classification was made. In considering each case it is the responsibility of the War Agricultural Committee to see that all farms in their district are maintained at full production and that workers are not sent elsewhere when they could be better employed at home. Rural workers who are made available for either full-time employment or for seasonal work will be used only for work directly connected with food production.

Most areas of the State have now completed this survey and men classified as being available (Classes "*b*" and "*c*") are already being used in harvesting and to help in the processing of fruit and vegetables. This class of harvest labour is most sought after by farmers and has proved the best available since the men are used to farm work and can quickly adapt themselves to local methods.

The percentage of men interviewed, who have been made available, varies widely throughout the State which is mainly due to the varying nature of the branches of agriculture carried on; e.g., generally, dairying requires labour all the year round, but wheat and sheep farms have a definite slack season. The number of men interviewed for the Pool of Rural Labour up to the 31st December, 1943, was 12,550, of which 20 per cent. were available for part-time work and 1.3 per cent. for full-time employment on other farms. The few men who have been made available for full-time work have been readily placed on neighbouring farms where labour is short. In this manner a more equitable distribution of the manpower available has been possible.

Organizing Volunteer Labour

Considerable aid has been given to farmers by local townspeople, especially in the harvesting of their crops. This work has been purely a voluntary effort and has proved a great success. Parties have been organized by the townspeople themselves, the War Agricultural Committees allocating them to the

farms requiring labour most urgently. In many instances transport facilities had to be found and the necessary fuel provided. In this matter generous help has been given by the Local Transport Advisory Committees. This source of labour has been developed to a high degree in Geelong where citizens set up their own voluntary organization two years ago. Recently this organization was embodied in a Local Labour War Agricultural Committee. This Committee has on its register between 500 and 600 men who are prepared to weed vegetables and do other farming work in their spare time. It is noteworthy that last year voluntary week-end workers at Meredith within the Geelong district harvested £1,200 worth of peas which otherwise would have been lost.

A similar organization has recently been formed at Colac where it is expected that at least 50 persons should be available. The wide variety of commodities grown in this district should provide ample scope for the new Committee's activities.

An auxiliary War Agricultural Committee was also formed at Wangaratta during the last harvest for the purpose of organizing townspeople who have volunteered to help with the harvest. About 150 people volunteered and helped with the cherry picking and the flax and grass hay harvest. Farmers throughout the district expressed their appreciation of the services rendered by these people. Volunteers from the town also responded well to an urgent appeal to cut firewood for butter factories in the district. The provision of this firewood did much to ease the serious position faced by these factories.

Another example of co-operation between town and country was provided last year at Bendigo. Approximately 40 men from that city went out at week-ends to help with harvesting. About 620 acres of hay was stooked by this group and in addition a quantity of lucerne hay and silage was dealt with.

The above examples are but a few of many similar cases which occur throughout the State. Considerable help is being given this season by these groups, and calls for this class of labour are increasing owing to the high standard set last harvest and the confidence inspired by their efforts.

Mention might also be made of the fine work done by schoolboys. A notable instance, among many others, is the picking of peas in the Shepparton district this year. Owing to a shortage of labour in the district and the quick maturing nature of the crop it seemed likely that a considerable quantity of the crop would be lost. However, groups of schoolboys organized by their Headmaster, saved the situation. Labour difficulties such as this must be settled locally and the prompt and willing way in which Headmasters in many centres have co-operated with the War Agricultural Committees has assisted greatly in the food production programme.

The securing of labour, especially for seasonal work, has been one of the main tasks of the War Agricultural Committees ever since their inception in August, 1942, and it is intended that this brief summary of the more recent aspects of the labour problem may indicate to some extent the complexity of the task. Too much stress cannot be laid on the help given to farmers by voluntary workers and further recruits to this already large army are always welcome.

HYGIENE IN PIG-KEEPING

Although pig-raising is a profitable side-line on many farms, some owners do not pay sufficient attention to the conditions under which pigs are kept.

Pigs kept in dirty, insanitary sties do not thrive well and are more susceptible to disease and worm infestation. They do not grow as quickly, nor show such a good return for the food they consume, as those kept under better conditions.

Where possible, pigs should be run in small paddocks with movable shelters and feeding troughs. They are healthier and cleaner, and require less attention than when enclosed in sties.

If they must be enclosed, sties should have properly drained concrete floors. When there are several sties, the drains should not run through one sty to the next, as if any disease occurred in the top sty, infection could be carried through all sties by drainage. Floors should slope from the sleeping quarters and drain into a common drain running outside the pen.

Earthen floors with holes in which muck and stagnant water can accumulate should not be tolerated, as they are breeding grounds for disease and parasites

Troughs and feeding utensils should be kept clean, especially vats or drums for holding milk. Sickness and deaths in pigs are often traced to dirty drums in which milk is allowed to thicken and putrefy.

[Contributed by the Live Stock Division.

Live Stock Notes

Compiled by
A. C. T. HEWITT, M.Agr.Sc.,
Live Stock Science Officer

Dairy Cows and Sheep

THE graphs on the following page have been prepared to show that the slaughterings of lambs and calves, and the production of butter in Victoria last spring, were nearly one month behind the previous spring (1942).

Slaughterings of lambs for 1943 were almost exactly one month behind those of 1942, in that the figures for September, October, and November, 1943, corresponded closely with those of August, September, and October of the previous year. This time-lag may be attributed to a number of causes, such as the slowness of the early lambs in northern Victoria to fatten, due to the unfavorable season; the shortage of labour at the freezing works to slaughter the lambs, and the many difficulties under which farmers are working. Another important cause of the lateness of the lambing season must have been seasonal factors last summer. In these notes for December last, it was mentioned that ewes have annual breeding and non-breeding seasons, and that the breeding season normally commences in January, when a small percentage of ewes come "in season." More come "in season" during February, and usually by March 100 per cent. of the ewes will take the rams. Apparently the last breeding season was later than usual, and lambings were later in consequence.

It is generally considered that cows breed all the year round, but the calves slaughtered last year were fully two weeks behind slaughterings of the previous year. As calves are slaughtered as soon after birth as practicable, it can be assumed that calvings were fully two weeks later in 1943 than in 1942. The production of butter also has been fully two weeks behind that of 1942, and this supports the assumption that calvings were later. It would seem to be unlikely that the same influences would affect the calving season as the lambing season, and there may have been an unknown breeding factor lengthening the period between the cows' previous calvings and then coming "in season." On the other hand, the delayed calvings are more likely to have been a direct result of the shortage of labour on dairy farms —the bulls having been joined later, because farmers were too busy in the early spring to mate the cows, or, fearing a shortage of labour

to harvest fodder, mated the cows later to reduce the demands for feed in the early spring.

Unfortunately, with dairying, loss of early production caused by late calvings is not recovered, as late and early cows alike go off in their milk yields as soon as the dry weather sets in. Last winter was a very unfavorable one, particularly in Gippsland and parts of the Western District where fodder reserves were insufficient to meet requirements, and outside supplies were unprocurable.

The drop of nearly 17 per cent. in dairy production, during the first period of this fiscal year, is due mainly to shortage of labour on dairy farms, later calvings, the sale and slaughter of large numbers of dairy cows, the acute shortage of fodders, particularly bran, pollard, and chaff, and the competition of more remunerative crops, such as potatoes, onions, other vegetables, flax, &c., with dairying. Steps have been taken to reinstate labour on dairy farms, but as other labour is still leaving dairying the net result is about the same. The slaughter of dairy cows is continuing in much greater numbers than was anticipated, but this would be offset if many more calves were reared. Up to the present, the production of bran and pollard has not been raised sufficiently to meet demands, and a shortage still exists everywhere. Other foods, such as wheat, are available, and farmers should continue to feed as much wheat as is necessary, breaking it down with whatever bran and pollard is available.

Pigs

The National Security Order, issued some months ago, prohibiting the sale of fresh pork for consumption as such, was designed to divert a greater part of Australias' pig meat to bacon for which the demand is more urgent. This order has virtually put an end to the porker pig trade, and most farmers are now carrying their pigs on to baconer weights.

To breed baconers or bacon stores, pig raisers should use breeding stock of the large type, in preference to the short-bodied thick-set type, which was generally used for porker production.

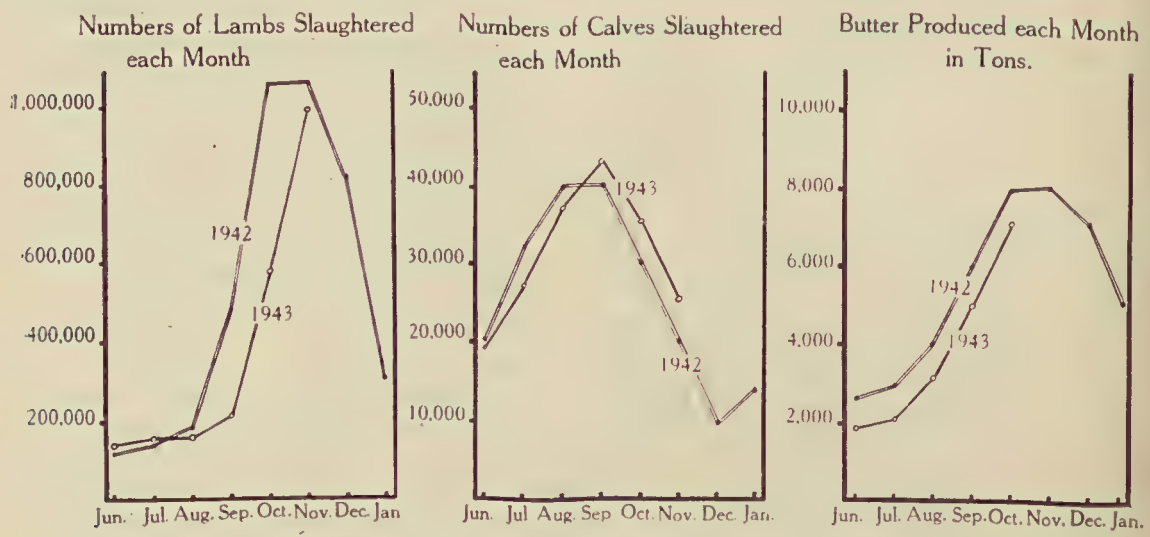
The small and compact types of pigs grow too slowly, and produce relatively short and over-fat baconer carcasses. Baconer carcasses are graded, and substantial deductions in price are provided under the Pig Meat Acquisition Plan for the lower grades.

Those pig breeders who have not yet made the desired change to bacon-type breeding stock should do so at the first opportunity. There is an ample supply of good quality baconer-type breeding pigs available for this purpose.

[L. A. Downey, H.D.A., Pig Expert.]

Poultry

Culls should be marketed to make room for more profitable birds. Culling is done mainly among birds in their second laying season, and the birds culled will be those obviously not worth keeping for another year.



The graphs show that the seasonal slaughterings of lambs and calves, and the production of butter in Victoria, during the spring of 1943, were nearly one month behind those of 1942.

Selection of Breeding Stock.

The normal breeding season will commence in June or July, and only the best birds should be selected for this purpose from now onwards. This selection of breeders is one of the most important undertakings for the year, as success will depend upon the judgment displayed in mating the right birds.

It is not possible to estimate the number of eggs a bird has laid or will lay without keeping an individual record of its performance, nor is it possible by handling to determine the desirable qualities a bird of either sex will transmit to its progeny. Egg production records and progeny tests, therefore, should be the real basis for the selection of breeders.

Few poultry farmers single-test or trap-nest their hens and, therefore, must rely on appearance and handling in their selection of breeding stock. It is an advantage if some specially good stock, bred by those who specialize in pedigree breeding and single testing, is introduced into the flock at regular intervals.

Poultry farmers should make a study of the principles of breeding. Good size, for instance, is an indication of good growth and development, while a bird that has not suffered any illness during the first two or three years of its life would appear to have developed some resistance to disease, especially if other birds in the same pen had developed ailments. Resistance to disease, good growth, and development, as well as a good egg yield, are the main considerations when selecting breeding stock.

Birds selected as breeders should be healthy and well cared for, so that they will lay eggs of the right size and quality suitable for hatching. In general, a good laying ration is satisfactory for breeding stock.

The following will serve as a guide in the selection of the best stock:—

A bird (male or female) should appear bright, active, and healthy. It should be mature, well-developed, of normal size, and vigorous in constitution. The eye should be full, prominent, and bright. The bird should have a good depth of body, with a long broad back and a straight breastbone. It should be tight in feather, and free from weaknesses, deformities, or visible external faults. If possible, the females should be proved layers of a good number of eggs of the required size, shape, and shell texture, and the birds of both sexes should be bred from families of high egg-producers, and with other good qualities.

[H. F. Clinton, Poultry Expert.]

Bees

Under prevailing conditions, work in the apiary will be limited to preventing individual colonies from deteriorating beyond the recovery point.

With the exception of the eastern portion of the State, scarcity of nectar is causing grave concern, and serious losses have already occurred. Where necessary, due to the lack of stores, bee-keepers are strongly advised to feed their bees with sugar syrup before brood rearing ceases.

During hot weather, in the case of weak colonies, hive entrances may be reduced to prevent robbing. Strong colonies will require a full opening for ventilation purposes.

As advised some time ago, full advantage should be taken by those adjacent to irrigation areas to place their hives in small groups within flying distance of clover and lucerne, as fresh pollen and a limited supply of nectar are usually available.

[J. W. Thomlinson, Apiary Inspector.]

Bees and Clover

The value of bees for the pollination of clover, fruit, and the blossom of many other commercially-grown plants is not fully realized. White and other clover seeds are now being grown commercially in Victoria, and to ensure that high yields of seed are obtained, it is essential that there be good pollination. It has been shown in America that clover without bees produced one-half bushel per acre, whereas with bees the yield was 8 bushels per acre.

With an annual clover like subterranean, good pollination is essential to ensure strong re-establishment of the stand the following year.

It is reckoned that in good white clover fields one hive per acre would be the ideal rate of stocking. There are millions of florets in a clover field, and each has to be individually fertilized. In such a field it is possible for a hive to store up to 10 lb. of honey per day under favorable conditions.

In America, apiarists consider that bees earn fifteen to twenty times more for the farmers by pollinating their crops for fruit and seed production than for apiarists in honey and wax production.

The establishment of apiaries near orchards and fields producing clover seed commercially for good pollination means much to the farmer. It is reported that in Canada some orchardists actually pay apiarists to keep bees in their orchards for pollination, while others purchase what are known as "package" bees each year, merely for pollination and then destroy the bees, a practice which, if wasteful in bees, is productive in fruit. Little, if any, surplus honey is produced from fruit trees.

In Victoria, few orchardists and clover seed growers take steps to ensure that a good field force of bees is available for pollination purposes, but depend upon apiarists and small beekeepers that just happen to have bees in the locality, on wild bees, other insects, and wind for this vital purpose.

At present, with the dearth of honey in the principal honey-gathering areas of Victoria, many apiarists have transferred their bees to irrigation areas to gather nectar from the clovers and lucerne. It is expected that, under present conditions, with the large number of hives transferred, and the irregularity of the clover fields, very little surplus honey will be stored there this year.

VETERINARY NOTES

Feeding of Dogs and Cats on the Farm

With meat rationing in operation, the feeding of domestic animals has become a problem with owners.

A very palatable and nourishing dog biscuit can be readily made in the home by taking 8 lb. of finely ground wheat and then boiling a sheep's pluck (heart, liver, and lungs), retaining the liquor for mixing with the wheat. Run the boiled meat through a mincer, add to the wheat, mix well, pour in warm liquor, adding one tablespoonful of salt, and knead like bread into a firm dough. Roll out into a flat sheet about half an inch thick, and cut into 3-in. squares. Bake till hard. This makes about five dozen biscuits. If available, cooked vegetables, such as cabbage, carrots, &c., may be minced and included before kneading. Care should be taken not to include any vegetables that have been sprayed or dusted for insect pest control, unless they have first been thoroughly washed.

[W. D. Shew, G.M.V.C., B.V.Sc., Senior Veterinary Officer.]

. . FIRE

can destroy the accumulated assets of years in a matter of minutes

PREVENT BUSH FIRES

Carrot Storage Experiments

By G. B. TINDALE, B.Agr.Sc.,* A. DOERY, B.Agr.Sc., † and Y. WILSON ‡

LARGE quantities of carrots are now being grown in Victoria to provide an important item of diet for the fighting forces and the civilian population. The carrot is of particular value on account of its rich vitamin A content. The bulk of the crop is canned, in which form the vegetable is most appetizing and may be transported anywhere without deterioration. The crop matures in the late autumn, but the quantity grown is so great that the canneries cannot handle all of it as it matures; indeed, the canning season is spread over several months, which necessitates the storage of a large part of the crop after it has been dug.

As carrots mature in the late autumn, they may be stored over the winter months merely by leaving them in the ground, undug. They must be lifted, however, towards the end of winter, otherwise they will commence to sprout. Although a storage period of some two or three months is obtainable in this way, it rarely suits the producer who grows the carrots on high-priced land, and who needs the land during the winter period to prepare it for the crop to follow.

The method adopted to date for the storage of carrots, other than leaving them in the ground, has been cool storage. The carrots are bagged and consigned to cool stores, usually in Melbourne, where they may be readily drawn upon by the canneries. Cool storage has proved effective but costly and, to ascertain if it would be possible to eliminate cool-storage charges, experiments to test the merits of pitting on the farm as against cool storage were conducted by the Department of Agriculture during the past year.

The test was carried out with carrots grown at two centres—(*a*) Bunyip, at the northern end of the Koo-wee-rup swamp, and (*b*) Lindenow, on rich alluvial flats of the Mitchell River.

At each centre excellent carrots of the Chantenay variety were grown and, as the commercial crop was being dug, approximately 1 ton was selected for pitting tests on the farm and a similar quantity was forwarded to the Experimental Chambers, Government Cool Stores, Melbourne, where it was cool-stored at 32 to 34 deg.

The pitting of the carrots was carried out in a similar manner at each centre. Meadow hay at Bunyip, and lucerne hay at Lindenow, was spread fairly thickly over the ground, which had been "chipped" free from grass. The carrots, after weighing, were stacked on the straw and built up into a "clamp" of triangular cross-section about 5 feet across the base and 3 feet to the ridge. The sides were then covered with straw, and finally the whole was covered with a thick coating of earth. The Bunyip pit was constructed on 30th July, and the Lindenow pit on 5th August. The pitted carrots were inspected from time to time by delving through the earth cover and withdrawing sample carrots. By the second week in September the carrots in the pit at Lindenow were attacked by mould, and it was decided to open up the pit (on 14th September) for examination of the carrots and determination of loss of weight. It was found that the condition of the carrots as a whole was very bad; most had become mouldy, the mould having penetrated the carrot at the crown. In most instances, the mould had penetrated only a short way into the core of the carrot, but even so these carrots were valueless. A few carrots had become completely mouldy and broken down into a wet, spewy mass. From the whole there was a highly objectionable stench, and the results must be regarded as a complete failure. With the rising spring temperatures, the carrots started to sprout, and under the conditions of high humidity and lack of light and aeration prevailing in the pit, the tender sprouts were rapidly invaded by moulds which soon extended down the core of the carrot.

Inspections of the Bunyip pit had not revealed any deterioration until mid-September, when it was observed that the carrots were beginning to sprout, and fearing rapid decay it was decided to open up the pit. This was done on 20th September, when the carrots were found to be generally in excellent condition (apart from the fact that they were

* Cool Storage Research Officer. † Officer in Charge of Vegetable Production, Koo-wee-rup District.
‡ Vegetable Supervisor, Lindenow District.

just beginning to sprout). In fact, they were in a condition similar to when first pitted. There were, however, a few rotted carrots. The carrots were weighed before pitting (2,420 lb.) and after pitting (2,128 lb. of sound carrots). The difference represents a loss of 12 per cent., which is made of (*a*) rotted carrots, (*b*) loss by transpiration (moisture loss) and loss by respiration of all the carrots. It was estimated (by count) that the rotted carrots did not exceed 2 per cent., hence there was a loss by transpiration and respiration of 10 per cent., which is quite considerable.

From the foregoing it will be seen that, at Lindenow, pitting was a failure, even after such a short storage period as six weeks, while at Bunyip the limit to storage life in the pit seemed to have been reached after seven weeks, during which period the carrots lost 10 per cent. in weight.

It would seem that rising temperatures in spring, with consequent sprouting of the carrots, limits the storage life of the pitted carrots, and probably a much longer storage life would have been obtained if the carrots had been pitted in early winter. On the other hand, it must be remembered that a considerable amount of labour is required to pit the carrots, and that during the winter months the bagged carrots would probably store quite as well if merely stacked in a more or less open shed.

Cool Storage

As previously stated, approximately 1 ton of carrots was despatched from both Bunyip and Lindenow at the time the carrots were pitted at those centres, and these carrots were promptly stored at 32 to 34 deg. at the Experimental Chambers, Government Cool Stores, Melbourne. They were examined from time to time in storage and no deterioration was observed. They were held in cool storage for four months (until 2nd December) when it was decided to terminate the experiment. They were then removed and the following day canned at a Melbourne cannery. At the cannery not a single carrot was rejected, and the condition of the carrots was classed as excellent.

The carrots from Bunyip and Lindenow were weighed before and after being placed in cool storage, and the loss in weight was found to be 3 per cent. and 5 per cent. respectively. The lesser loss in weight with the Bunyip carrots can probably be accounted for by the fact that they were stored in a chamber kept at a slightly lower temperature than the chamber in which the Lindenow carrots were stored, and hence respiration proceeded at a slightly slower rate.

The above experiment, coupled with commercial experience on a fairly large scale, indicates that carrots dug in the winter and promptly stored at 32 deg. may be kept in excellent condition for a period of three to four months, whereas, if pitted on the farm, the storage life is limited to early September, when, under the influence of rising temperatures, the carrots commence to sprout.

It is suggested that in designing the canning programme, cool storage be resorted to for the carrots to be canned after the beginning of September, but for carrots to be canned during the winter months satisfactory results would be forthcoming by leaving the carrots in the ground, where possible, while bagging the carrots and storing them in cool sheds could probably be effective. The storage period would, of course, be relatively short. Carrots intended for long storage should be cool stored promptly after digging and not be allowed to deteriorate by leaving them on the farm for long intervals after digging.

Commercial Storage of Carrots

During the year, large quantities of carrots were stored in several cool stores, awaiting canning, and the cool storage research officer was asked to make inspections of these carrots and report on condition, &c. In most stores, the out-turn was most satisfactory, but in one store there were large losses.

It was observed that wherever the chambers had been tightly stacked with bagged carrots there was trouble due to gas accumulating. This was the CO_2 gas respired by the carrots themselves. Indeed, in some stores the gas was so "high" that it was not possible to enter the chamber except for a few moments. The gas was most evident during the early period of storage. It is evident that carrots respire at a much faster rate than does fruit, for gas had never been known to accumulate to such an extent when fruit was stored in the same stores. The gas, however, except for one store, gradually leaked away, and as the temperature of the carrots was reduced to 32 deg., further production of CO_2 was limited. In the store where the high gas content persisted, most of the carrots ultimately broke down and were attacked by mould.

[*Continued on page 74.*

Seed Certification in Victoria

List of Growers and Registered Areas Approved for 1943-44 Season

SEED certification schemes are in operation in Victoria in respect of the following species and strains of pasture seeds:—

1. Victorian Perennial Rye Grass.
2. Victorian Phalaris Tuberosa.
3. Tallarook "Late Flowering" Subterranean Clover.
4. Bacchus Marsh "Early Flowering" Subterranean Clover.
5. Victorian Irrigation White Clover.

Areas and growers approved for the 1943–44 season are as follow:—

1. Victorian Perennial Rye Grass.

R.G.— 1. Pickford, A., Clunes.
2. Pickford, H., Clunes.
6. Toose, H. A., Smeaton.
9. Troup, G., Tourello.
10. Sewell, Chas. W., Kooroocheang.
14. Mezzeni, E., Smeaton.
15. Wickham, T. B., Clunes.
16. Robinson, H. J., Clunes.
19. Pickford, C. A., Clunes.
20. Pickford, John, Clunes.
21. Foulkes, W. C., Clunes.
22. Williams, A., Smeaton.
23. Kinnersley, W., Tourello.
27. McCrum, John, Smeaton.
28. McKinnon, A., Smeaton.
29. Grieve, A. D., Blampied.
30. Grieve, H. J., Smeaton.
31. Sewell, A. J., and D. H., Smeaton.
33. Toose, G. C., and A. W., Smeaton.
34. Clarkson, E. W., Avonleigh, Tourello.
35. May, W. H., Smeaton.
41. Muller, C. T., Ullina.
43. Carter, J. R., Executors of the Estate of, Clunes.
44. Drife, G. R. H., Clunes.
46. Cosgrave Bros., Smeaton.
47. Bunn, J., and Sons, Allendale.
51. Drife, C. J. H., Clunes.
52. Drife, T. W., Clunes.
53. Griffiin, J. M., Coghill's Creek.
54. Hives, J. H., Kingston.
55. Muller, J. H., Smeaton.
59. Armstrong, J. R., Allendale.
69. McLennan, A. C., Clunes.
72. Ford, E. H., Clunes.
74. Redman Bros., Smeaton.
88. Wrathall, D. W., Clunes.
93. Luhrs, C. R., Wendouree.
99. White, R. T., Cardigan.
102. Higgins, F. W., Irrewarra.
104. Currington, A. H., Warncoort.
106. Saddlier, E., Warncoort.
107. England, S. C., Warncoort.

R.G.—108. England, W. G., Warncoort.
109. Hawtin, A. W., Colac West.
112. Hawtin, F., Colac West.
114. Hay, D., and J., Private Bag, Colac.
116. Kenny, M., Cororooke.
118. Martin, H. L., Irrewarra.
119. Menzel, C., Armytage.
120. Menzel, R. K., Armytage.
123. McMillan, T. S., Cororooke.
125. Roache, John, Nalangil.
126. Roache, P., 23 Ligar-street, Colac.
128. Ryan, D. M., "Basin Banks," Private Bag, Colac.
131. Armstrong, A. W., Irrewarra.
133. Rankin, A., "The Hill," Colac.
134. Baulch, G. R., Colac.
137. Drewry, C. G., Ondit.
138. McCready, D. W., "Gnarwyn," Ondit.
140. Dignan Bros., Warncoort.
141. Hughes, A. E., Neales Private Bag, Colac.
142. McDonald, J. J., and Sons, Birregurra.
147. Mackay, D. G., Irrewarra.
148. Middleton, A. H., Nalangil.
149. Middleton Bros., Nalangil.
150. Speirs, A., Nalangil.
153. Pyke, C., Larpent.
155. Vagg, E. L., and Son, Larpent.
158. Spalding, J. A., Private Bag, Colac.
160. Billing, F., Colac.
163. Inglis, T. W., Private Bag, Colac.
166. Inglis, A. D. C., Private Bag, Colac.
167. Speirs, F., No. 1 Private Bag, Colac.
169. Collins, G. J., Irrewarra.
178. Buckle, W., Larpent.
181. Gubbins, N., Birregurra.
188. Barry, J., Colac.
199. Ryan, H. L., Irrewarra.
201. Bolton, M. F., Malmsbury.
202. Ward, A. S., and J., Box 31, Kyneton.
205. Brady, F., Kyneton.
206. Hutcheson, S. G., Box 7, Kyneton.
208. Keegan Bros., 15 High-street, Kyneton.
213. Thompson, R. H., Kyneton.
217. Young, H. H., Malmsbury.
224. Portwine, E. C., Post Office, Lauriston.
225. Trowhella, C., and A. B., Newham.
226. Dettman, W., Kyneton South.
231. O'Donnell, J., Kyneton.
234. Henderson, L., Lauriston, via Kyneton.
235. Girvan, J. H., Taradale.
236. Coiles, J. F., Kyneton.
237. Brown, M. T., West Kyneton.
238. Carroll, Henry, South Kyneton.
239. Coiles, R. G., Kyneton.
240. Halloran, J. F., c/o Mailman, Kyneton.
251. Buchholz, L., Lismore.
257. Mahoney, John, Kolora.
258. Moloney, P. G., Terang.
275. Purcell, M., and Sons, Bessiebelle.
295. Staughton, A. J., Terang.
296. Huf, P. H., Croxton East, Hamilton.

R.G.—306. Walton, W. A., Burrumbeet.
307. Robinson, H., and E. J., Kooroocheang.
315. Kierce, J., Clunes.
320. Mezzeni, W., Kooroocheang.
331. MacRae, C., and J. M., Tourello.
406. Roache, D. J., Nalangil.
407. Menzel, A. A., Winchelsea.
408. Walsh, James, Swan Marsh.
418. Williams, O., Colac.
419. Sutherland, J. W., Nalangil.
422. Craig, N., and I., Winchelsea.
423. Craig, N., and I., Winchelsea.
424. Nicholas, A. W., Birregurra.
431. Bourke, James, Cororooke.
433. Reeves, T., 4 Calvert-street, Colac.
436. Stewart, G. M., Box 18, Birregurra.
438. Johnston, S. A., Birregurra.
444. Burns, A., Corunnun.
450. Champness, P. L., Mount Moriac, via Geelong.
454. Bauer, C., Cororocke.
455. Brown, R. C., Alvie.
456. Fisher, L. T., Warrion.
458. Finlay, A., Cororooke.
459. McKenzie, D. G., Private Bag, Colac.
460. McRae, A. J., 87 Gravesend-street, Colac.
463. Inglis, G., Warrion.
464. McCready, A., Box 60, Colac Post Office.
465. Middleton, J. J., Nalangil.
466. Gillon, T. C., Armytage.
467. Delahunty, J., Alvie.
468. Wilson, R. O., c/o D. Mckenzie, Private Bag, Colac.
469. Kerr, F. R., Warrion.
470. Trigg, E., Cororooke.

R.G.—471. Nelson, C., Private Bag, Colac.
472. Tetaz, C. A., Warrion.
473. Sheedy, Matt, Cororooke.
474. Dennis, A. W., Warncoort.
475. Wilson, A., Cororooke.
476. Smith, Jock, "Mittonbank," Alvie.
477. Hole, E., and Sons, Winchelsea.
478. Gent, G., and L., Warrion.
479. Stinchcombe, E. W., Box 52, Colac.
480. Burke, E. J., Elliminyt.
481. Alexander, W., Colac.
482. Stinchcombe, W., Colac.
483. Brien, W. H., Whoorel.
484. Read, J., Elliminyt.

2. Victorian Phalaris Tuberosa.

P.T.—15. Beach, H. E., Birregurra.

3. Tallarook "Late Flowering" Subterranean Clover.

Nil.

4. Bacchus Marsh "Early Flowering" Subterranean Clover.

B.M.—1. Toose, G. C., and A. W., Smeaton.
4. Koch, L. T., Wando Dale, via Coleraine.

5. Victorian Irrigation White Clover.

I.W.— 2. Hamley, H. J., Dingee.
3. Jackman, J. W., Dingee.
5. Jackman, F. H., Dingee.
7. McEwen, J., Stanhope.
13. Bullingham, J. S., Tongala.

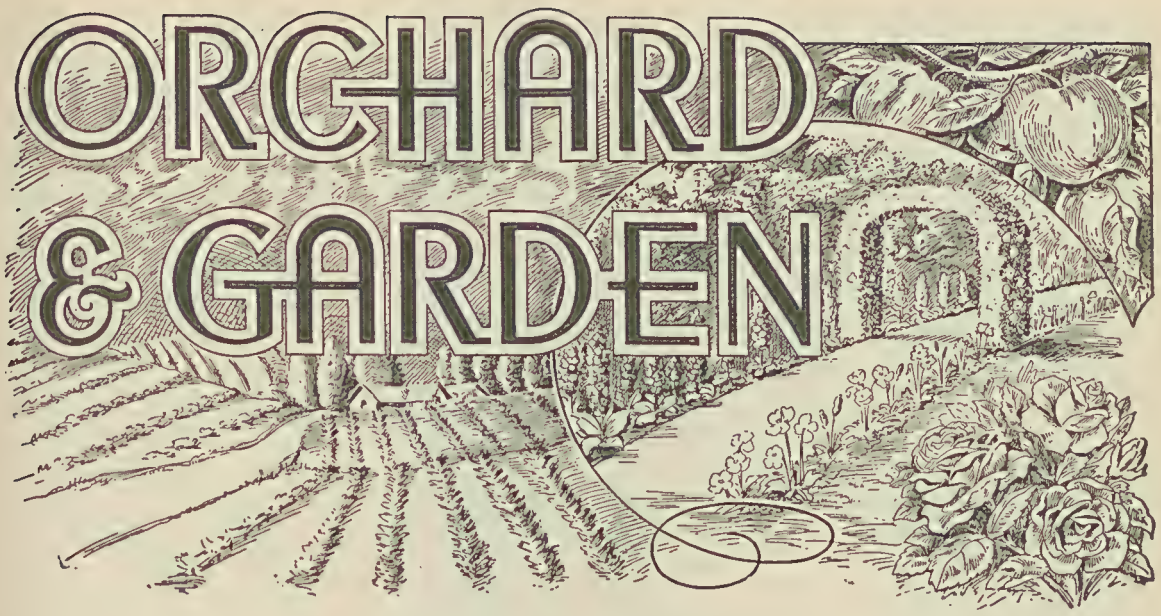
CARROT STORAGE EXPERIMENTS—*continued from page 72.*

It was noticeable that the condition of the carrots was much superior in those stores where the temperature was kept low (at 32 deg.) compared with the condition in other stores where temperatures were nearer 34 to 36 deg.

In one store where the temperature was over 40 deg. the carrots had sprouted. The condition of the carrots was best in those stores where the carrots had not been stacked too tightly. This allowed for free circulation of cold air among the carrots, and no difficulty was experienced due to gas accumulation. It is suggested that stacking three bags high on end, or six bags high on the flat, should be the limit, with ample provision made for vertical spaces throughout the stack to allow for air circulation.

Gas Storage Experiments with Carrots

In view of the fact that quite large accumulations of CO_2 gas were occurring in commercial stores storing carrots, it was deemed advisable to carry out some gas-storage experiments to determine the reaction of the carrots to varying concentrations of CO_2 gas. With apples in cool storage CO_2 up to 5 per cent. is known to be very beneficial, but a concentration of 10 per cent. is harmful, as it brings about the internal disorder known as Brown Heart. It was decided to "gas store" carrots at 32 deg. in three gas atmospheres, i.e., 5 per cent., 7·5 per cent., 10 per cent. CO_2. In each instance, the carrots were shut up in gas-tight cabinets, and the CO_2 respired by the carrots allowed to build up to these levels, after which the gas content was held at these levels by controlled ventilation with "outside" air. Compared with fruit, the carrots built up the desired atmosphere quickly. The carrots selected for the gas-storage experiments were taken from the "cool-storage controls" forwarded in connexion with the Bunyip pitting experiment. After being held in gas storage for four months, the carrots were examined, when it was found that the carrots from all three atmospheres were all in excellent condition and still possessed of excellent aroma and flavour. It is evident that carrots can withstand 10 per cent. CO_2 without harm. However, just what percentage of CO_2 will cause harm to the carrots is yet to be determined. As no obvious difference could be detected between the gas-stored carrots and the air-stored control carrots even after four months' storage at 32 deg., it is not possible from this test to state if any advantage is to be derived by gas storage.



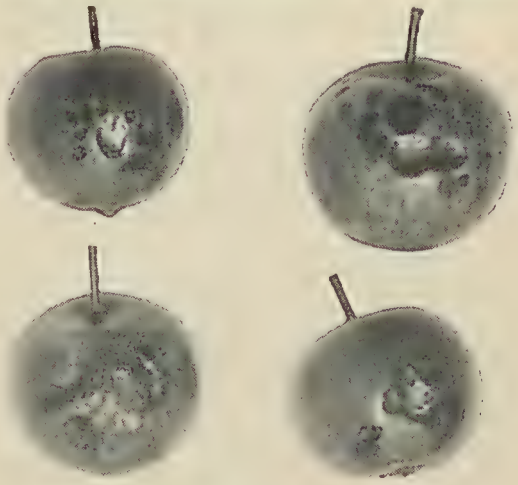
IN THE ORCHARD

Contributed by Officers of the Horticultural Division

Heat Injury to Fruit

THE summer rarely passes without hot weather affecting fruit in some degree. Last season, extensive damage occurred towards the end of January, when a period of three hot days, during which humidity was fairly high, literally "cooked" a large quantity of fruit. Apples mainly were affected, and in a number of instances the injury was not visible from the outside but consisted of an internal browning. In many parts of the State lemons were similarly affected. Fruit, which from the outside appeared normal, or perhaps slightly brown, was almost completely dried out.

This season, following a cool spring, high temperatures and hot northerly winds on New Year's Day caused severe scorching of leaves and fruit of many varieties. Apples were again severely injured, this time visible brown patches appearing, mostly on the north-west side of the trees where fruit was exposed to the sun. Late varieties of cherries became dried up on the trees, while leaves and fruit of berries were scorched. Stone fruits seem to be less severely affected. Where apples had been previously sprayed with lime-sulphur, typical sulphur burn, such as that illustrated, was noticed. Straight-out sunburn differs from this in that it consists of a single brown patch. Although the damage sustained is hardly likely to affect the size of the anticipated apple crop, a lesson that comes out of this experience is that trees in good foliage showed less damage because of the shielding



Jonathan apples showing heat injury following a lime-sulphur spray.

effect of the leaves, and the aim of growers should be to maintain trees in a vigorous state by adequate fertilizing and watering.

Green Manuring

A preliminary note concerning green manuring is necessary because of the shortages of seed and superphosphate which are anticipated. Growers should make arrangements as soon as possible to secure their supplies. Seed of field peas and New Zealand blue lupins will be available, and should be sown at the rate of 1½ bushels per acre. The ration of superphosphate will be ¾ cwt. per acre for the area to be sown.

Stone Fruits

Unsatisfactory bearing of stone fruits can frequently be ascribed to lack of necessary attention at this time of the year. With the removal of fruit there is a tendency to forget about the trees for the rest of the year. It should be remembered, however, that this period is most important in the lives of stone fruit trees, when they are actively storing up food supplies required for the blossoming next spring. On non-irrigated orchards, weed control will allow trees to make use of all available soil moisture. If water is available, supplies should be kept up to the trees so that they will be enabled to make full use of the remaining growing period.

Peach Rust

Peach rust, a disease characterized by small yellow spots on the upper sides of peach leaves, and pustules discharging brown spores on the undersides, has been noticed in orchards near Melbourne. Pitting of the fruit may occur if leaf infection is severe. Dry-mix lime sulphur, made by mixing together 12 lb. limil, 12 lb. finely divided sulphur, and 1 lb. calcium caseinate spreader and adding to 100 gallons water, is a satisfactory cover spray for this disease.

Red Spider

Red spiders, or bryobia mites, are almost universally present on apple and pear trees, and frequently stone fruits may also be affected. If the leaves of trees are a dull, yellowish green colour, the presence of these mites may be suspected. Close examination of the under surfaces of leaves will reveal these tiny brown or red mites, and numerous red eggs also may be seen on the under surfaces of leaves and twigs. Sprays of lime-sulphur or red oil in the winter are usually satisfactory for the control of these pests. It has been noticed that, where apple trees have been thoroughly sprayed several times with lime-sulphur during the spring and early summer for the control of black spot, the numbers of these mites have been greatly reduced. Sprays of white oil emulsion, alone or in combination with arsenate of lead, have also proved effective. Because these pests may seriously affect the health of apple and pear trees and cause a premature drop of fruit, white oil sprays should be used in the summer if large infestations are noticed.

IN THE GARDEN

By J. L. PROVAN, B.Agr.Sc., Principal, School of Horticulture, Burnley Gardens

FEBRUARY is usually a dry, hot month and garden beds should be mulched with manure or compost to retain moisture and to keep the soil cool. If these materials are not available, dried weeds, prunings, &c., may be used. Plants such as dahlias, which require a good deal of moisture for successful growth, and summer flowering annuals should take preference with regard to the mulching. Inspect dahlias for red spider, which infects the lower side of the dahlia leaves near the midrib and causes a light mottling, which is visible on the upper surface. If red spider is found, apply nicotine sulphate, 1 tablespoonful to 2 gallons of water, with a little soft soap added, as soon as possible. If this pest is neglected it multiplies quickly and causes much damage.

The young growing tips of dahlia plants should be examined for larvae of the light brown apple moth. This larvae is green in colour and very active and ties the young growing tips and the flower buds together with a fine web. When not very prevalent, in a small garden, the easiest method is to squeeze the young growing tips between the fingers and kill the larvae. A spray of arsenate of lead, 1 oz. in a gallon of water can be used on larger areas.

Preparation of Beds for Winter Flowers

Beds should now be prepared for winter flowering plants, such as Iceland poppies. Choose a sunny position sheltered from southerly and westerly winds, and build up the beds at least 6 inches above the surrounding paths and lawns. This will ensure drier conditions during the wet winter and spring months. Dig in plenty of organic matter in preparing these beds. Towards the end of the month and early in March, seedlings can be planted out.

Preparation of beds for winter-flowering plants such as the Iceland poppy should now be put in hand.

The same preparation should be adopted for beds in which it is intended to plant bulbs, but in this case it is advisable to place any well decomposed manure or compost well below the level at which bulb will be planted. Planting of bulbs may be postponed until March, but it is advisable to prepare these beds this month.

THE VEGETABLE GARDEN

Cabbages and Cauliflowers

Seedlings of *Early Allhead* cabbage and *Early Eclipse* cauliflower may be planted out this month. It is very important with these early Crucifers that they be planted while the weather is warm, in order to get them well established. They make good leafy growth during the autumn and form their heads in the early winter.

Space the cabbage plants 2 feet apart in rows 2 ft. 6 in. apart. Rich, well manured soil is essential for good growth of these plants. Use blood and bone manure at the rate of 4 ounces to the square yard.

Spinach

Prickly Seeded Spinach can be sown in drills 15 inches apart and about ½ inch deep. Cover the drill with a small amount of sieved manure to retain the moisture in the surface soil until the seed germinates. Like the Crucifers, this crop requires a rich soil. When the plants are large enough, thin out 4 to 6 inches apart.

Onions

Seed of the early, white-skinned types of onions should be sown in seed beds this month, the varieties usually grown are *Silver Skin, Early Barletta* and *White Queen.* It is essential to use fresh seed, because onion seed usually does not remain viable for more than two years

Spring onions should be sown in specially prepared beds this month. *White Lisbon* seed is usually used for this purpose. When sowing, space the seed approximately ½ inch. apart. Spring onions, to be successful, must be grown quickly, and therefore, do not let the young seedlings receive a check due to dry conditions, otherwise they will become too strong in flavour.

Bush Fire Relief

Victorian Committee Appointed

The Victorian Government has appointed the Victorian Bush Fires Relief Committee on which the Commonwealth Government and the Melbourne City Council have representation. The Committee functions under the Chairmanship of the Honorable G. L. Chandler, M.L.C., Honorary Minister.

The personnel of the Committee is:—The Hon. G. L. Chandler, M.L.C., Chairman; the Hon. R. T. Pollard, M.H.R., representing the Commonwealth Government; the Hon. A. McK. McDonald, M.H.R., representing the Municipalities; Messrs. W. J. Jungwirth, Secretary, Premier's Department; H. C. Forster, Chairman, Central Executive, War Agricultural Committee; C. C. Gale, Secretary, Public Works Department; W. W. Gay, Forests Commissioner; W. Murray, Under Secretary for Lands; R. J. de C. Talbot, Department of Agriculture; and L. G. Wilson, Treasury Department, representing the Victorian Government; Mr. H. S. Wootton, Town Clerk of Melbourne; the Hon. F. W. Bulcock, Director-General of Agriculture; and Messrs. F. W. Kerr, J. V. Moroney, G. P. N. Watt, representing the Commonwealth Government, and J. C. Macgibbon, Secretary and Executive Officer.

The Committee will deal with all matters of general policy and approvals for the allocation of moneys from Bush Fires Relief Funds. A Victorian Bush Fires Relief Account has been established in the Victorian Treasury. All moneys contributed by the Commonwealth and the Victorian Governments, the Lord Mayor's Bush Fires Relief Appeal and all other funds raised in response to public appeals will be paid into the Victorian Bush Fires Relief Account.

The following organization has been established for the arranging of the provision of fodder, fencing material, building materials and tools, as well as immediate relief by local organizations:—

The Local Authority will consist of the following:—Shire Secretary; Chairman of the District and Local War Agricultural Committees; Police Officer.

The *Shire Secretary* will act as the local Executive Officer, will submit reports on the damage in the district and prepare schedules of requirements.

The *War Agricultural Committees* will sponsor applications for goods required, and make arrangements for delivery of those supplies that are made available by the controlling authorities. Allocations of the available fodder and materials will be arranged by the Local War Agricultural Committees.

The following Sub-Committees have been appointed to date:—

(1) *Fodder Sub-Committee.*—This is responsible for making arrangements for the provision of fodder to meet the requirements for the various areas. Where possible, the Local Authority should make arrangements for the requirements for its own district.

(2) *Fencing Sub-Committee.*—This is responsible for making arrangements for the provision of fencing material and for matters in connection therewith. Allocations of fencing material will be made by the Victorian Bush Fires Relief Committee to local retailers, and allotments of these goods to individuals will be made by the local War Agricultural Committees.

Tents will be made available, *on loan,* from the Victorian Bush Fires Relief Committee. Applications should be lodged with the Local War Agricultural Committees.

Supplies of axes and handles, wedges, maul-rings, post-hole shovels and handles, and tools will be made available to the local storekeeper. When renewing supplies, the local storekeeper is to submit orders to the Local War Agricultural Committees.

Where able to pay, the person receiving goods and services will be debited with the cost of same on reasonable market basis. Where a person is unable to pay the whole or portion of the expenditure, he should make application through the Shire Secretary to the Secretary, Victorian Bush Fires Relief Committee, Treasury Gardens, Melbourne, C.2 (Telephone No. F0234).

"WITHERTOP" (Calcium Deficiency) DISEASE IN FLAX

By C. R. MILLIKAN, M.Agr.Sc., Plant Pathologist, Biological Branch

"Withertop" is a disease which has caused heavy losses in some flax-growing areas. Severe losses in crops grown on clay soils, notably in the Western district and Gippsland, have occurred. In the North-eastern district the disease has been of minor importance only.

Withertop is due to a temporary deficiency of calcium in the flax plant induced by waterlogging of the soil during the stage of rapid elongation.

The effects of lime in preventing the disease have been strikingly demonstrated in a field experiment at Lismore. Plants in the unlimed plots developed 92·2 per cent. of Withertop; those in plots receiving 1 ton of lime per acre developed 5·6 per cent., while the disease was completely absent in plots receiving 4 tons of lime per acre.

A DISEASE of flax which has apparently not been described in the literature has occurred in flax crops in Victoria. The name, "Withertop," has been given to the condition.

Withertop was first noticed in 1939, but it was not until three years later, after the flax acreage in the State had been greatly increased, and severe losses due to the disease had occurred, that the investigations described below were commenced. The object of this work was to obtain information on the cause of the disease, and to develop methods of controlling it in the field.

OCCURRENCE IN VICTORIA

Withertop disease of flax has occurred in a number of flax-growing districts in Victoria as shown in Figure 1. The damage caused has varied from a trace up to almost 100 per cent. over an area of as much as 100 acres. In the Colac district in 1941, 10 per cent. of the area under flax was not harvested because of the disease. From 10th May to the end of September in that year, 112 rainy days out of 143 were recorded at Colac. The general loss due to the disease in Victoria, however, would be considerably less, probably about 1 per cent.

Withertop may appear any time from about the middle of September onward. Crops are not affected until they are 12 to 15 inches and upwards in height and making rapid growth. Usually very little Withertop develops after about the middle of October. The earliest report to date was of a very early crop of Liral Crown at Digger's Rest, which first exhibited symptoms of the trouble towards the end of August.

The disease is usually more prevalent in early-sown than in late-sown crops, and also may be more prevalent in Liral Crown than in the Concurrent variety. In some instances Liral Crown had been affected and Concurrent sown on an adjacent area remained unaffected. These observations led to the impression that Concurrent was much more resistant to the disease than Liral Crown, but this is not so. Some Concurrent crops showing up to 80 per cent. of Withertop have occurred. As indicated later, the important factor controlling the incidence of Withertop is that soil conditions favouring the development of the trouble should occur at a time when the plant is most susceptible to the disease, i.e., when it is 12 to 15 inches or more in height and making rapid growth.

Some information regarding the types of soils involved is given in Table 1, compiled from analytical data from the Agricultural Research Chemist. It is seen that

they are silty clays or clay loams which are acid in reaction and moderately low in total lime. The drainage in these soils is usually poor. A typical soil profile is that from an experimental area at Lismore:—0–24 inches grey clay loam to clay, 24 to 36 inches yellow clay, below 36 inches limestone rubble.

TABLE 1.—CHEMICAL DATA OF SOIL SAMPLES (SURFACE 6 IN.) OBTAINED FROM UNDER FLAX AFFECTED WITH WITHERTOP DISEASE.

Locality.	Soil Type.	pH Value.	Total Lime.
			p.p. 100,000
Mt. Bute ..	Yellow-grey; clay loam to clay with buckshot	6·0	155
Struan ..	Yellow-grey; silty clay loam with buckshot	5·8	120
Gnarpurt ..	Grey; clay loam to clay	5·9	103
Gnarkeet ..	Grey; clay loam to clay	6·3	135
Birregurra..	Brownish-grey; clay loam	5·5	147
Winchelsea	Yellow-grey; clay loam to clay	5·3	88
Gisborne ..	Brown-grey; loam to clay loam	5·8	145

In districts where the disease occurred, it appeared to be definitely associated with a waterlogged condition of the soil resulting from excessive rainfall or seepage. The disease also tended to be more prevalent in double-sown areas.

The relationship between soil waterlogging and the incidence of Withertop was subsequently confined in experiments described below. From the end of September onwards, the soil in general tends to dry out with the approach of warmer and drier weather, so that there is an increasing probability that crops which were not sufficiently advanced and therefore not affected when the soil was waterlogged in the early part of the season would escape the disease due to the drying out of the soil. This explains the general observation that the incidence of Withertop was less in the late-sown than the early-sown crops, and in the Concurrent variety than in the Liral Crown variety. Concurrent makes slower growth than Liral Crown in the early part of the season.

SYMPTOMS

Although the disease may occur at any stage after the plant commences rapid growth in the spring, it most commonly develops in September and early October under Victorian conditions. It is characteristic that symptoms appear very rapidly—usually in a few hours. The first sign of trouble is the occurrence of a sharp bend approximately 2 to 4 inches below

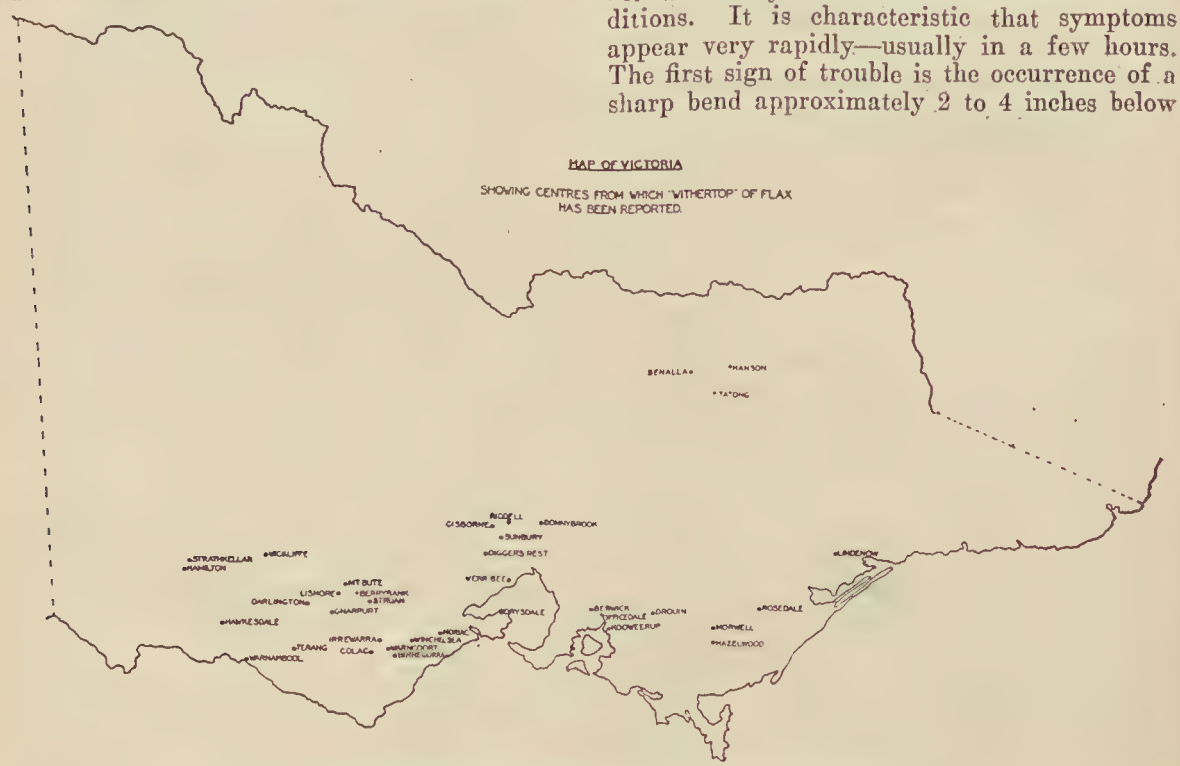


Fig. 1.—Distribution of Withertop disease of flax in Victoria.

the tip of the plant. The stem at the point of the bend soon loses all rigidity and the top of the plant falls down with its own weight and hangs in a vertical position. When bending first occurs, there is no sign of browning either at the bend or above it. However, necrosis soon commences at the point of the bend, and extends rapidly until the whole of the bent-over portion is dead (Fig. 2). This symptom gives affected patches in a crop a brown appearance when viewed from a distance in contrast with the normal green colour of surrounding healthy plants. The stem below the bend remains apparently normal.

Affected plants may occur in well-defined patches in which the ground is usually depressed and waterlogged, or an entire crop may be affected. In the latter case, infection may vary from a fraction of 1 per cent. of plants scattered more or less uniformly through the crop, up to 80 or 90 per cent. of affected plants.

Within a few days of the development of the browning of the top of the stem, the plant usually sends out secondary shoots from the axils of the leaves immediately below the affected top. With the onset of drier weather, these shoots develop normally. Where the soil is again waterlogged later, however, this second growth may also develop Withertop symptoms.

Where Withertop occurs some time after bud formation, the individual flower stalks only may collapse (Fig. 4). A very mild form of the disease, involving only a necrosis of the flower sepals from the tips downwards, has also been observed in the field.

Plants severely affected with Withertop produce short fibre of low value. Where second growth has occurred, the fibre is usually broken during the scutching process at the point where it joins the main stem, thus producing the two fibres each of considerably less than standard length.

MINERAL DEFICIENCY EXPERIMENTS

Method

Sand cultures were set up to determine symptoms of deficiencies of calcium, phosphorus, nitrogen, magnesium and potassium respectively, in flax. Symptoms of calcium, zinc, and copper deficiencies were also studied in water cultures using purified salts and water.

Fig. 2.—Withertop of Liral Crown flax plants collected in the field.

Plants of both Liral Crown and Concurrent varieties were used. In all experiments except the water cultures with calcium, the plants were subjected to the deficiency treatment from the seedling stage.

In the water culture experiments with calcium the plants were grown in a complete nutrient solution including adequate calcium until they were approximately 15 inches high. Half the plants in the experiment were then placed in calcium deficient solutions. The remainder were maintained in the complete solutions. There were six pots, each containing eight plants in both treatments.

Results

The following is a brief description of the symptoms of the deficiencies which developed.

Calcium Deficiency.

When subjected to a very severe calcium deficiency, the plants did not survive the seedling stage. The bottom leaves became abnormally dark-green, while the tops of the plants became chlorotic, which condition was followed almost immediately by a necrosis of the upper leaves from the tips, while the lower leaves remained apparently normal (Fig. 5). Finally, the whole plant died. The roots of the plants also showed signs of severe necrosis. These

Fig. 3.—Calcium deficiency symptoms produced in sand culture experiments at Burnley. Note the typical "Withertop" condition.

symptoms of calcium deficiency in flax are similar to those described by Von Portheim (1901) Schropp and Arenz (1939) and Pierre and Allaway (1941). A similar "tip necrosis" has been observed in young Liral Crown flax plants growing in waterlogged soil in the Western District of Victoria and in pot experiments at Burnley using waterlogged Winchelsea soil. These are described later.

When subjected to mild calcium deficiency, the flax plants made very good growth for approximately 16 weeks. However, when the plants were about 18 inches high, symptoms which appeared to be identical with Withertop as it occurs in the field, developed suddenly. Sometimes, not always, a slight brownish discolouration appeared about 1½ to 2 inches below the tip of the plant. This was followed within a few hours by a sharp bend at this point. Necrosis of the stem at the point of bending followed rapidly, while the tip of the plant remained green for some time afterwards. Within two or three days, however, the whole of the stem above the bend became necrotic.

In sand cultures, this condition was equally prevalent in Liral Crown and Concurrent. Individual plants of both varieties appeared to withstand mild calcium deficiency better than others. In some instances, symptoms did not appear till just before flowering or even later. In this instance the symptoms were confined to a sharp bending and necrosis of the flower stalk. The plants in which Withertop occurred some time before flowering soon developed several secondary shoots from the axils of the leaves immediately below the Withertop lesion. These shoots appeared to develop normally for some time but finally they also developed typical Withertop symptoms.

In the water culture experiment, also, typical symptoms of Withertop as described above were induced in flax plants which were subjected to a sudden deficiency of calcium after growing in a complete solution until approximately 15 inches high. The symptoms first appeared ten days after placing the plants in the calcium deficient solution. The roots of the plants also became noticeably dark in colour within the same period. Later, necrosis developed from the tips of the roots. This browning and necrosis of the roots is a symptom typical of many plants subjected to calcium deficiency (von Portheim 1901). This result supports the work of Petrie (1934) which showed that a continuous supply of calcium must be available to the plant for normal growth to occur.

Fig. 4.—Calcium deficiency symptoms which developed at a later stage than in Fig. 3.

Phosphorus Deficiency.

The plants became very stunted in growth and typically darker green in colour than normal, i.e., a condition of hyperchlorophylly. The leaves remained small and tended to be closely pressed against the stem of the plant. Later death of the lower leaves occurred (Fig. 5). These symptoms were observed in flax growing in the Morwell district of Victoria in 1942. Plants in an untreated strip across the paddock were shorter and darker green in colour than the remainder of the crop to which superphosphate had been applied. A similar symptom of hyperchlorophylly due to a deficiency of phosphorus in a variety of plants has been described by Merkenschlager (1932), Millikan (1939), and by other workers.

Nitrogen Deficiency.

The dwarfed habit of growth, and leaves with their axis parallel with the main stem characteristic of the nitrogen deficient plants, was similar to the symptoms exhibited by plants suffering from phosphorus deficiency; the important difference being that the former plants were much paler green than normal whereas the latter were a darker green than normal.

Magnesium Deficiency.

The plants appeared to grow normally for a week or so, but soon a stunting of growth and a slight general chlorosis became apparent. Shortly afterwards the lower leaves began to die, characteristically from the tips. The upper leaves remained apparently normal though slightly chlorotic.

Potassium Deficiency.

The potassium-deficient plants were very similar in appearance to the magnesium deficient plants, with the important difference that in the case of the former, the upper leaves retained an apparently normal green colour. These symptoms of potassium deficiency in flax are similar to those described by Schropp (1938). Stunting and death of the oldest leaves are symptoms characteristic of potassium deficiency in a wide range of plants.

Zinc Deficiency.

Symptoms of zinc deficiency in flax have been described in a previous paper (Millikan, 1942.) Briefly they consisted of stunting, the development of bronze spots on the leaves, and death of the tip of the plant. This disease is prevalent in flax grown on Wimmera black soil. Several suspected cases of zinc deficiency have also occurred on isolated areas in the Western District of Victoria.

Copper Deficiency.

The symptoms of copper deficiency in flax have been described elsewhere (Piper, 1942; Millikan, 1943). They consisted of stunting,

Fig. 5.—Mineral deficiency symptoms in flax grown in sand cultures. Left to right, deficiencies of calcium, phosphorus, nitrogen, magnesium and potassium respectively.

general chlorosis and marked inrolling and twisting, particularly of the upper leaves.

Conclusion

The conclusion to be drawn from the above results of mineral deficiency experiments is that whereas mild calcium deficiency symptoms are apparently identical with those of Withertop disease as it occurs in the field, the symptom of deficiencies of either phosphorus, nitrogen, magnesium, potassium, zinc or copper are quite different from those of Withertop disease. Withertop disease may develop in plants subjected to a sudden deficiency of calcium when approximately 15 inches high.

THE CALCIUM STATUS OF PLANTS AFFECTED WITH WITHERTOP DISEASE

In view of the fact that flax plants subjected to calcium deficiency in sand cultures developed symptoms apparently identical with those of Withertop, steps were taken to obtain information regarding the calcium status of plants affected with Withertop.

Two samples, one of healthy and one of diseased plants were obtained from each of seven different crops as indicated in Table 2, and were analysed for calcium by the Agricultural Research Chemist. The results are shown in Table 2.

TABLE 2.—SHOWING THE COMPARATIVE LIME (CaO) CONTENTS (AS PER CENT. ON DRY BASIS) OF PAIRS OF SAMPLES—ONE OF HEALTHY FLAX AND ONE OF PLANTS SHOWING WITHERTOP SYMPTOMS, OBTAINED FROM EACH OF SEVEN DIFFERENT FLAX CROPS IN VICTORIA.

Variety.	Locality.	Lime (CaO).	
		Healthy Plants.	Plants showing "Withertop" Symptoms.
		%	%
Concurrent ..	Gnarpurt ..	0·51	0·28
Concurrent ..	Birregurra ..	0·56	0·43
Concurrent ..	Irrewarra ..	0·51	0·43
Concurrent ..	Struan ..	0·68	0·40
Liral Crown	Struan ..	0·55	0·54
Liral Crown	Gisborne ..	0·72	0·63
Liral Crown	Digger's Rest	0·69	0·47

In each instance, the plants were cut off 7 inches above the roots and the whole of the upper portion was analysed. In the case of the Concurrent samples from Irrewarra, an analysis of the whole plant was compared with that of plants cut 7 inches above ground level. The results were as follow:—

	Lime (CaO).	
	Healthy Plants.	Plants showing Withertop Symptoms.
	%	%
Whole Plants	0·49	0·42
Plants cut 7 inches above ground level	0·51	0·43

It will be seen that differences in the lime (CaO) content between healthy and diseased plants were of the same order irrespective of whether whole plants or plants minus the bottom 7 inches were analysed. These chemical analyses have shown that flax plants showing Withertop symptoms have a lower calcium content than comparable normal plants.

WATERLOGGING EXPERIMENTS

It is known that variations in soil moisture may affect the pH value and the availability of certain minerals in some soils. Keaton (1938) and Huberty and Haas (1939) observed that, while most soils showed but little difference, excess of moisture in certain soils may lower the pH value.

Excessive amounts of soil moisture have been recorded as inducing magnesium or calcium deficiency diseases in plants on certain soil types. Garner *et al* (1922) first described the disease of tobacco due to magnesium deficiency in North Carolina. The name "sand drown" was given to the trouble as it was found to occur on the more sandy portions of fields after heavy rainfall. The condition was aggravated by applications of sulphur. The direct relation of excessive soil moisture to the incidence of "sand drown" was subsequently confirmed by Anderson and Swanback (1929), Garner *et al* (1930), Cooper *et al* (1934) and McMurtrey (1938) among others. The disease was cured by applications of magnesium salts.

The calcium content of plants growing on certain soils may also be decreased by periods of excessive rainfall. Daniel and Harper (1935) showed that the calcium content of

Fig. 6.—Six weeks old Liral Crown flax plants growing in Winchelsea soil. Left—Waterlogged for five weeks. Right—Not waterlogged. Waterlogged plants showed retarded growth. Their cotyledons were very chlorotic and the leaves tended to be closely pressed to the stems.

native grass and alfalfa grown on different soils was decreased and the phosphorus content increased during periods of high rainfall. When the effective rainfall was low, the reverse was true. Similarly, Edwards and Goff (1935) in a study of five species of grasses growing in different locations found that the lowest calcium percentage occurred in the wet section. Excessive rains were also found to produce considerable calcium deficiency in tobacco in Connecticut (Swanback, 1939). This latter observation confirms the experience of McMurtrey (1938). It is known that calcium is less mobile in the plant than N, Mg, P and K (the plant possesses capacity to re-utilize these to a considerable degree (Petrie, 1934)), so that a continuous supply of calcium must be available to the plant for normal growth to occur. A sudden deficiency of the element characteristically produces symptoms in the youngest portions of the plant. In certain instances, McMurtrey observed tobacco plants in which the top leaves manifested no abnormality although calcium deficiency symptoms were evident on the middle leaves of the plant. The recovery of the top leaves appeared to be associated with the incidence of dry periods, and is similar to the apparently normal second growth which occurs in flax affected with Withertop in Victoria with the onset of drier conditions. Where the calcium deficiency in the substrate is maintained as in sand cultures, this second growth also develops Withertop symptoms.

The mechanism, whereby excessive soil moisture renders magnesium or calcium physiologically unavailable to plants under certain conditions, is not at present fully determined. In the lighter sandy soils leaching is important, but in heavier clay soils other factors are probably also involved.

In experiments with flax on a peaty-clay soil, Shulov (1909) found that the lowest yield was obtained with the highest moisture content.

As stated above, field observations have indicated that the incidence of Withertop disease of flax in Victoria appeared to be associated with a waterlogged condition of the soil in which the plants were growing. In order to confirm this observation, the experiments described on page 86 were performed at the Plant Research Laboratory, Burnley, during the two seasons 1942 and 1943.

Fig. 7.—Calcium deficiency symptoms in eight weeks old Liral Crown flax plants at the end of seven weeks of waterlogging. The prolonged waterlogging had retarded growth and a form of "tip necrosis," not typical of Withertop occurred.

Method

Soils from areas at Winchelsea, Digger's Rest and Gnarpurt, on which flax crops had shown very high percentages of Withertop disease, were set up in glazed earthenware pots Each pot had a side hole at the bottom into which a rubber stopper could be inserted for waterlogging purposes. Before sowing, each pot received a dressing of superphosphate at the rate of 1½ cwt. per acre.

In the Winchelsea soil series, three different periods of waterlogging were applied. The durations of these periods are shown in Figure 8. In the experiments with Digger's Rest and Gnarpurt soils, the plants were waterlogged when approximately 15 inches high. Each treatment was replicated five times in Winchelsea and Digger's Rest soils and six times in Gnarpurt soil.

After the appearance of Withertop symptoms, counts of the amount of disease present were made at frequent intervals until the termination of the experiments. This enabled the curves shown in Figure 8 to be drawn.

Results

In the Winchelsea soil experiment, it was found that early waterlogging (Period 1, Fig, 8) caused a marked retardation in growth compared with the plants not waterlogged (Fig. 6). The cotyledons became yellow and the leaves tended to be closely pressed against the stem. After approximately eight to ten weeks the tips of some of the plants became necrotic, the symptoms first appearing as a marginal scorch of the youngest leaves (Fig. 7). This symptom appears to be identical to that of severe calcium deficiency described previously (Fig. 5). Typical Withertop symptoms did not occur until a week or so later when the rate of elongation of the plants began to increase.

The results set out in Figure 8 clearly show that the incidence of Withertop disease of flax is definitely increased by waterlogging of the soil. Further, it is evident that this effect is greatest when the waterlogging occurs in the spring about the time the plant is 12 to 15 inches (or more) in height, and undergoing rapid elongation.

EXPERIMENTS WITH CALCIUM SALTS

The flax plant is apparently sensitive to increasing soil acidity. In spite of the belief that flax thrived best on slightly acid soil, Selle (1926) found in Westphalia that approximately 75 per cent. of the crops were grown on neutral to strongly alkaline soils. The best crops occurred on soils rich in lime and the poorest

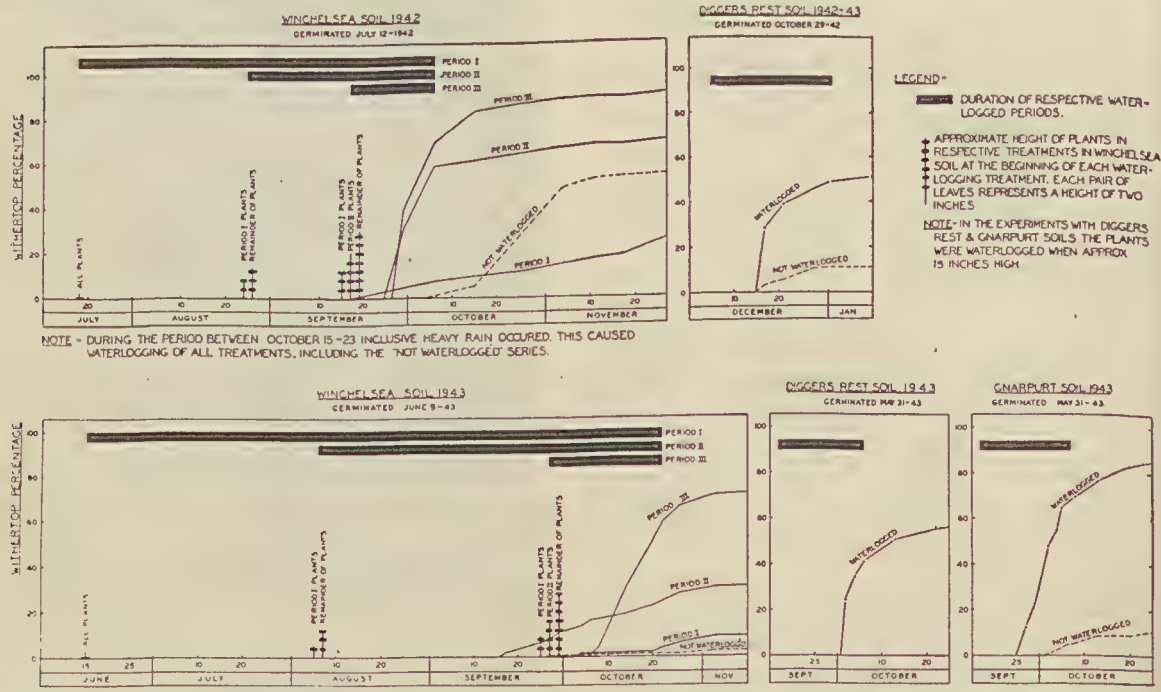


Fig. 8.—Showing effects of waterlogging at different stages of growth on the development of Withertop (calcium deficiency) disease in Liral Crown flax plants grown in Winchelsea, Digger's Rest and Gnarpurt soils respectively, in pots.

on the most acid soil. Similarly, Nehring (1934) adjusted an acid soil to various reactions from pH 5·0–7·8 by the addition of lime, and found that flax gave greater yields at the higher pH levels. Jahnel (1939) also observed that on very acid soils (pH 4.3) the root development of flax was so weakened that the plants sustained severe damage from infection by *Botrytis cinerea,* which reduced plants to one-third their normal height and caused many gaps in stands.

Plants sensitive to soil acidity were found by Crane (1926) to be unable to absorb calcium ions at low pH values. This is a case of a plant nutrient deficiency due to the physiological unavailability of calcium at low pH (De Turk, 1941). Both soil texture and soil reaction have been proved by Fonder (1929) to be capable of influencing the calcium content of pea plants, and to such an extent as to obscure the effect of the calcium concentration of the soil solution. Seasonal variations of from 0·2 to 2·0 pH units have been observed by Hester and Shelton (1933).

The necessity of applying lime with care is evident from reports in the literature, of lime-induced injury in flax. Truninger (1927) reported that excess lime injured the leaf and root growth of flax, while Deterre (1928) states that excess calcium results in short fibre. Robinson and Cook (1931) found that calcium when applied in the previous year had only a slightly beneficial effect on yields and lowered the percentage of fibre in the straw. In most cases it also lowered fibre strength and hackling percentage, indicating a poorer quality of fibre. Magnesium applied with calcium tended to counteract the bad effect produced by the latter on fibre strength. On the other hand, Bel'skii (1939) found that applications of lime in amounts equivalent to the hydrolytic acidity of the soil gave maximum yields of flax and maximum length of stalk.

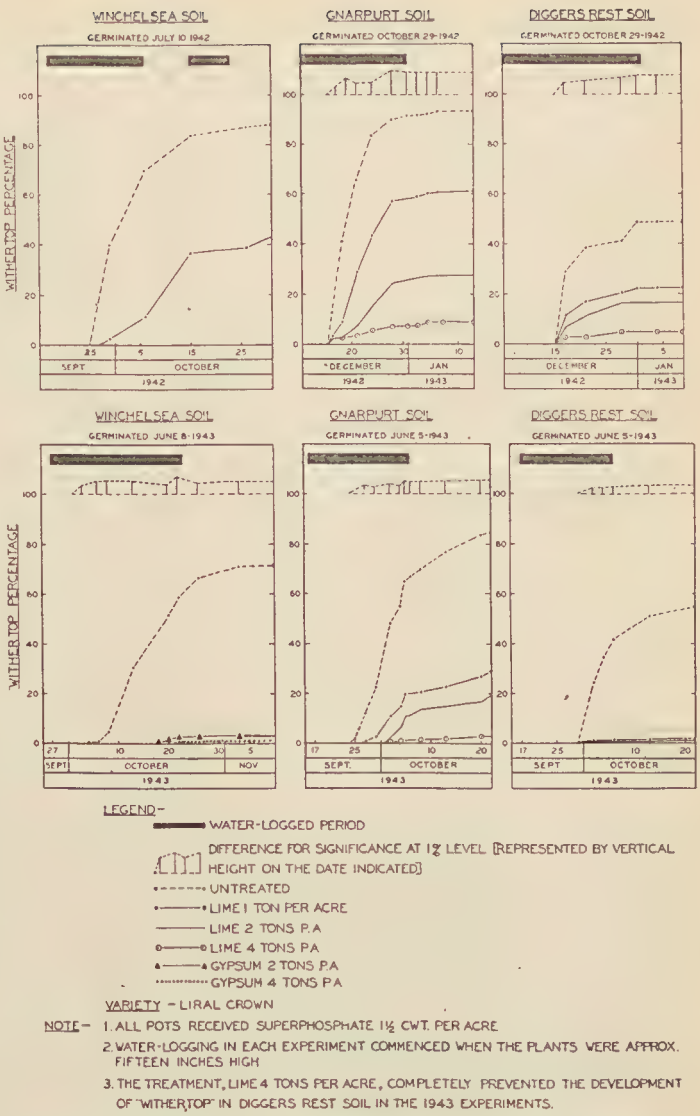


Fig. 9.—Showing effects of applications of lime or gypsum, at varying rates per acre to Winchelsea, Gnarpurt and Digger's Rest soils respectively, on the development of Withertop disease in flax grown therein in pots during the seasons 1942 and 1943.

The relation of weather to the lime requirement of the flax plant has been studied by Kostiuchenko (1938). It was found that when moisture is plentiful, lime acts favorably on flax. In a dry year, however, even small amounts of lime exert a depressing effect on flax owing to the intake of large quantities of calcium by the plant. Applications of boron were found to mitigate the injurious effects of calcium, by preventing the absorption of calcium by the plants. The chlorosis caused

by excess of calcium carbonate is claimed by Scholz (1934) to be due to a deficiency of iron, and can be cured in early growth by applications of salts of iron. Kurts (1937) recommends for flax a deep application of a fertilizer containing sulphate of ammonia, superphosphate, and calcium salts. He claims that this treatment had a more favorable effect on yields than did a shallow application. The effect was also in an increase in fibre strength and number of fibres.

The effects of liming on the exchangeable calcium in soils has been studied by numerous workers. Longnecker and Sprague (1940) and Muhr *et al* (1943) have shown that highly significant increases in exchangeable calcium and in pH result from liming, particularly on soils with a high permeability to water.

The experimental evidence presented earlier in this paper strongly indicated that the Withertop disease of flax which occurs on acid clay soils in Victoria was due to a deficiency of calcium brought about or aggravated by waterlogging of the soil. The effect of applications of calcium salts on the incidence of the disease were, therefore, studied in both pot and field experiments during the two seasons 1942 and 1943.

(a) Pot Experiments

Method.—In 1942, three experiments were set up using soil from different flax growing areas, namely, Winchelsea, Gnarpurt and Digger's Rest. In each instance, the particular area from which the soil was obtained had produced a flax crop very severely affected with Withertop.

The lime treatments which were applied to each soil are shown in Figure 9 and Table 3.

To determine the residual effects of treating the soil with lime, the Gnarpurt and Digger's Rest soils were re-sown in 1943 without any further lime treatment. However, in 1943, a new series of pots was set up with the Winchelsea soil in which gypsum at 2 and 4 tons per acre, respectively, were used instead of lime 1 ton per acre as in the previous year.

In all experiments except that with Winchelsea soil in 1942, the treatments were replicated six times and the pots received a dressing of superphosphate 1½ cwt. per acre at sowing time. The variety of flax used was Liral Crown, and one hundred plants were grown per pot.

Fig. 10.—Showing effects of waterlogging and treatment with lime 1 ton per acre on the incidence of Withertop disease in Liral Crown flax growing in Winchelsea soil.

Waterlogging was commenced in each experiment when the plants had reached a height of approximately 15 inches and continued for about a fortnight.

After the appearance of Withertop symptoms, counts of the amount of disease present were made at frequent intervals. These counts enabled the curves shown in Figure 9 to be drawn.

At the termination of the 1943 experiments, composite soil samples were obtained from each treatment, and pH determinations were made on them.

Results.—The effects of applications of lime or gypsum on the final incidence of Withertop are shown in Table 3, while the actual development of the disease in each treatment is shown in Figure 9.

TABLE 3.—EFFECTS OF APPLICATIONS OF LIME OR GYPSUM TO WINCHELSEA, GNARPURT AND DIGGER'S REST SOILS RESPECTIVELY, ON THE SOIL REACTION AND THE DEVELOPMENT OF WITHERTOP DISEASE IN LIRAL CROWN FLAX GROWN THEREIN IN POTS DURING THE SEASONS 1942 AND 1943.

Treatment per Acre.*	1942.	1943.	
	Final Withertop Percentage.†	Final Withertop Percentage.†	pH Value.
Winchelsea Soil.			
Untreated.. ..	88·1	71·6	6·0
Lime, 1 ton ..	43·0	..	..
Gypsum, 2 tons ..	..	2·6	5·3
Gypsum, 4 tons ..	..	0·4	5·3
Difference for Significance at 1 per cent. level	..	5·1	..
Gnarpurt Soil.			
Untreated.. ..	93·2	84·5	6·0
Lime, 1 ton ..	60·5	29·3	7·1
Lime, 2 tons ..	27·9	19·3	7·6
Lime, 4 tons ..	8·8	2·9	7·9
Difference for Significance at 1 per cent. level	8·2	5·4	..
Digger's Rest Soil.			
Untreated.. ..	48·2	55·1	7·1
Lime, 1 ton ..	22·1	1·2	7·6
Lime, 2 tons ..	16·9	0·4	7·9
Lime, 4 tons ..	4·8	0·0	8·2
Difference for Significance at 1 per cent. level	7·1	3·6	..

* All pots received superphosphate, 1½ cwt. per acre at sowing.
† For actual development of disease in each treatment, see Figure 9.

It is seen that applications of lime or gypsum appreciably reduced the amount of Withertop disease which occurred in flax grown in waterlogged soils. A comparison of the 1942 and 1943 results with Gnarpurt and Digger's Rest soils further demonstrates that the control of the disease is greater twelve months after the application of the lime than in a sowing made immediately afterwards.

It must be noted that on all these experiments the treatments with lime or gypsum had (other than their effect on the incidence of Withertop disease) no observable effects on either the general growth or colour of the plants.

(b) Field Experiments

In the 1943 season, a field experiment was laid down on the property of Mr. H. T. Grimwade, Lismore, to study the effects of various dressings of lime on the incidence of Withertop under field conditions.

Method.—The site selected was one on which a flax crop grown in the previous season had shown a very high percentage of Withertop. The soil profile of this area was:—0–24 inches grey clay loam to clay, 24 to 36 inches yellow clay, below 36 inches limestone rubble. The pH of the surface soil was 6.0.

The treatments studied in this experiment are set out in Table 4. The ground limestone treatments were applied to the soil approximately two months before sowing, whereas the slaked lime treatments were applied at sowing time. Provision was made for a buffer plot on each side of the ground limestone plots to allow for any spread of the lime that might occur. The individual plots were each approximately 1/40th acre in area, and all treatments were replicated four times in randomized blocks. The experiment was sown early (end of May) to increase the possibility of Withertop developing later. The variety used was Concurrent. Approximately, four weeks after the first appearance of the disease, counts were made to determine the percentage of Withertop in each plot.

Results.—Until Withertop occurred in the plots, there was no observable difference in growth or colour between any treatment.

The early sowing ensured that the plants had reached a susceptible stage (approximately 15 to 20 inches in height) by the middle of September. During the latter half of this month over 3 inches of rain were recorded and the

soil became very waterlogged. Withertop first occurred early in October and the counts shown in Table 4 were made approximately four weeks later, at which time the soil had dried up, and the incidence of the disease had become constant.

TABLE 4.—RESULTS OF FIELD EXPERIMENT AT LISMORE 1943, SHOWING THE EFFECTS OF CERTAIN LIME TREATMENTS ON THE INCIDENCE OF WITHERTOP DISEASE IN CONCURRENT FLAX.

Treatment per Acre.	Withertop.
	%
Untreated	92·2
Superphosphate, 1 cwt	88·4
Superphosphate, 2 cwt	94·0
Superphosphate, 1 cwt. + slaked lime 3 cwt.	59·7
Superphosphate, 1 cwt. + sulphate of ammonia, 1 cwt. + slaked lime, 3 cwt.	58·4
Superphosphate, 1 cwt. + slaked lime 1 ton	5·6
Superphosphate, 1 cwt. + ground limestone, 1 ton	5·6
Superphosphate, 1 cwt. + ground limestone, 2 tons	0·5
Superphosphate, 1 cwt. + ground limestone, 4 tons	0·0
Difference for significance at 1 per cent. level	4·4

The results set out in Table 4 afford striking confirmation of the pot experiments described above. The degree of control of the disease effected by 1 ton of lime per acre was greater in this experiment than in the pot experiments with Gnarpurt soil. Even as little as 3 cwt. of slaked lime per acre effected an appreciable reduction in the disease, while it was completely absent in the limestone 4 tons per acre treatment.

The appearance of a lime-treated plot at the time the counts were made is shown in Figure 11.

All straw produced on the unlimed areas was valueless for fibre, while the limed plants produced a heavy yield of high quality straw.

SUMMARY

Withertop disease of flax has occurred in a number of flax-growing districts in Victoria. The disease usually appears from the middle of September onwards in crops 12 to 15 inches or more in height and making rapid growth. In the field the disease appeared to be definitely associated with a waterlogged condition of the soil resulting from excessive rainfall or seepage. It appeared also to be more prevalent in double-sown areas. The soils concerned are acid in reaction and contain a high percentage of clay.

It is characteristic of the disease that symptoms appear very rapidly. A sharp bend occurs about 2 inches below the tip of the plant and the part of the plant above the bend soon becomes necrotic. Second growth which appears normal occurs from just below the diseased top.

From the results of mineral deficiency experiments using sand and water cultures, the conclusion was drawn that, whereas mild calcium deficiency symptoms were identical with those of Withertop disease as it occurs in the field, the symptoms of deficiencies of either phosphorus, nitrogen, magnesium, potassium, zinc or copper, are quite different from those of Withertop disease. Typical Withertop symptoms developed in flax plants which were grown in a complete nutrient solution until approximately 15 inches high, and then transferred to a calcium deficient solution.

Chemical analyses revealed that the plants showing Withertop symptoms had a considerably lower calcium concentration than the corresponding healthy plants from the same crop.

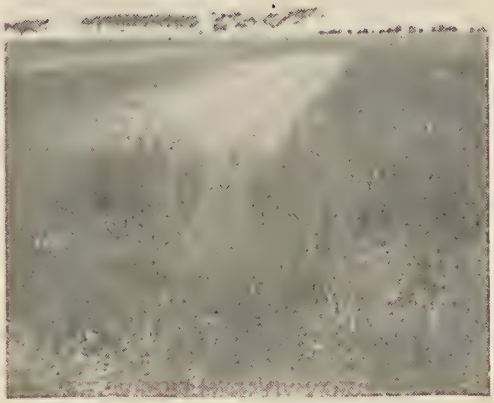


Fig. 11.—Portion of field experiment at Lismore, 1943. The centre plot received lime 1 ton per acre. The unlimed plots on either side showed over 90 per cent. of Withertop disease.

In pot experiments using Winchelsea and Digger's Rest soils, the incidence of Withertop was definitely increased by waterlogging the soils. From the results, it appears that the effect is greatest when the waterlogging occurs about the time the flax plant is approximately 12 to 15 inches in height and undergoing rapid elongation. Before it reached this stage, it was found that the flax plant would tolerate long periods of waterlogging. In such cases, growth was retarded. However, after ten weeks waterlogging, some plants developed a "tip necrosis" apparently identical with symptoms of severe calcium deficiency.

Waterlogging had no effect on soil reaction.

The effects of applications of calcium salts on the incidence of the disease were studied in both pot and field experiments. Results of pot experiments showed that the disease was controlled by the application of either lime or gypsum at rates of from 1 to 4 tons per acre. The heaviest dressing was the most effective.

These results were strikingly confirmed in a field experiment. The degree of control of Withertop disease effected by 1 ton of lime per acre was greater in this experiment than in the pot experiments. As little as 3 cwt. of slaked lime per acre effected an appreciable reduction in the disease while it was completely absent in the limestone 4 tons per acre treatment. All straw produced on the unlimed areas was valueless for fibre, while the limed plants produced a heavy yield of high quality straw.

[Acknowledgment]

The writer desires to acknowledge the ready co-operation given by officers of the Flax Production Committee of the Department of Supply and Shipping, who greatly facilitated the investigations.

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BURNING TOBACCO CAUSES MANY BUSH FIRES

DON'T KNOCK YOUR PIPE OUT WHILE IT'S HOT

Home Preservation of Peaches

By RACHEL M. PEILE, Fruit Preserving Expert

PEACHES are a favourite fruit with many people either in the fresh or preserved state. When the fruit is preserved by bottling, pulping or jam-making it should be firm ripe and of good flavour. Both the yellow and white fleshed varieties preserve well and some ways are given hereunder for their preservation. Yellow varieties, excellent for bottling and drying, are Golden Queen, Pullar's Cling, Goodman's Choice, and Elberta, while any white variety of good flavour is suitable.

Bottling

The peaches should be peeled, but may be left whole or cut as desired. To remove the stone from the clingstone varieties, cut the fruit right round close to the stone with a sharp knife, then twist the halves in opposite directions, when they should separate easily. The stone may be removed with a sharp-edged teaspoon. To peel, immerse the halves or whole fruit in a boiling caustic solution, 1 oz. caustic soda to 1 qt. water, for 40 to 50 seconds according to stage of ripeness, then rinse well in fresh water when the skin will peel off leaving a smooth clear surface. The softer white varieties should be dipped in boiling water or peeled by hand. As the fruit is being prepared, it should be dropped into slightly salted water to prevent it discolouring.

Peaches being dipped in boiling caustic solution to remove skins.

Pack the prepared peaches into the jars, then fill each jar with cold syrup made by boiling 4 oz. sugar to 1 pint water; place the lids loosely on the tops of the jars, and sterilize —white varieties for 30 minutes, yellow varieties for 40 minutes. Overflow the jars with boiling syrup and seal immediately.

An Inexpensive Method

Make a syrup in the preserving pan using 4 oz. sugar to 1 pint water. Put in the prepared peaches. Place the lid on the pan and cook the fruit gently until it is tender (about 20 minutes) then ladle the fruit, boiling hot, into *hot* sterilized jars and seal immediately. To sterilize the jars put them into a large saucepan or boiler with all other utensils to be used and pour in 3 or 4 inches of cold water. Bring the water to the boil and keep it boiling for ten minutes.

Pulping without Sugar

A greater quantity of fruit may be preserved in each jar if the fruit is pulped without sugar.

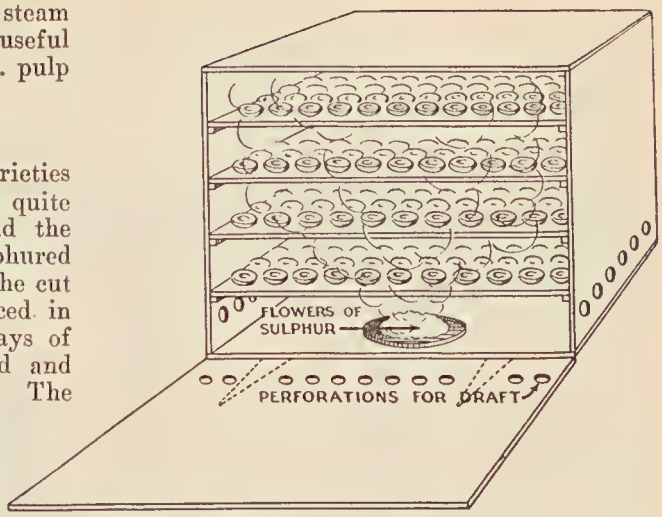
Prepare the peaches by peeling, stoning and cutting up. Place the fruit in a preserving pan with a small amount of water to prevent burning. Boil the pulp gently but thoroughly for 20 to 25 minutes, then place it, boiling hot, into *hot* sterilized jars and seal immediately. If desired sugar may be added to the pulp using half a cup to each lb. of peaches.

Peach pulp is excellent for pies, steam puddings and small tarts. It is also useful for jam making when 1 lb. sugar to 1 lb. pulp is used.

Drying

The yellow firm-fleshed, free-stone varieties are the best for drying, and should be quite ripe. They should be cut in half and the stone removed. If they are to be sulphured the halves are placed on the trays with the cut sides uppermost and the trays are placed in the sulphur box for 3 hours. The trays of fruit should then be carefully removed and placed in a suitable position for drying. The drying period depends on drying conditions. When the fruit is sufficiently dry, the pieces should be pliable and when twisted in the fingers should show no sign of moisture. Store in paper bags or boxes.

When light-coloured fruits are sulphured they retain a bright colour. If unsulphured, they dry well but turn dark brown in colour. Sulphuring is not essential.



Sulphur box suitable for sulphuring peaches. The trays are made of fly wire or perforated wood.

Sulphuring

The trays of fruit are placed in a box similar to that illustrated. On the sides of the box cleats 3 or 4 inches apart are placed for tray rests. The fruit is placed in the cabinet and enveloped with fumes of the burning sulphur.

The amount of sulphur used is approximately in the proportion of 1 lb. to every 100 cubic feet, or about 1 oz. to each 10 lb. of fresh fruit. The sulphur should be placed in a saucer on the floor of the box, and ignited. The lid is then closed, and the fruit subjected to the fumes for at least three hours. It is then ready for drying.

Recipes

Light Plum and Peach

3 lb. peaches.
3 lb. plums.
5 lb. sugar.

Stone and halve the fruit. Place in a preserving pan with 1 pint of water. Cook gently with the lid on the pan until the fruit is tender. Add the sugar and boil until of a good consistency.

Dried Peach Jam

1 lb. dried peaches.
2 quarts water.
4 lb. sugar.
Juice of 2 large lemons.

Soak the peaches overnight in the water. Next day simmer with the lemon juice until cooked. Add the sugar and boil until of a good consistency.

Peach Chutney

4 lb. peaches.
1 lb. stoned raisins or sultanas.
¼ lb. preserved ginger if available (not essential).
2 oz. garlick or 1 lb. onions.
1 oz. salt.
1 lb. brown sugar.
1 pint vinegar.
Cayenne to taste or
1 level dessertspoon peppercorns.

Peel and cut up peaches. Thinly slice ginger and garlic. Simmer all together until of a good colour and consistency—about 1 hour.

PUT OUT YOUR "SMOKE" WHEN FINISHED—PREVENT BUSH FIRES

Tubercle-free Herds

Accredited Tubercle-free Herds.

The following herds have been declared free of tuberculosis under the *Accredited Tubercle-free Herd Scheme* conducted by the Department of Agriculture. Under this scheme a tubercle-free accredited herd of cattle is one in which the entire herd has passed two negative, successive, annual physical examinations and tuberculin tests, or upon disclosure of infection, three semi-annual, successive physical examinations and tuberculin tests applied by a State Veterinarian or by a qualified and registered veterinarian who is approved by the Chief Veterinary Inspector for that purpose.

Name.	Address.	Number in Herd.
Ballarat Orphanage	Ballarat	135
Banyule Stud Pty. Ltd.	Wangaratta	31
Black, I. S., Estate	Mount Noorat	53
Clarke, A. B.	Glenormiston South	15
Dennis, Mrs. A. A.	Frankston	42
Dookie Agricultural College	Dookie	85
Dunbar and Clark, Messrs.	"Hazeldean Dairy," Mount Dandenong	18
Geelong Grammar School	Corio	68
Gibson, Mrs. C. S.	"Sweeney's," Eltham	35
Gorman, A. W.	"Cathcart," Alexandra	57
Henry, J. A.	Warrnambool	41
Hollaway, R. W.	Caldermeade	75
Mrs. G. Howlett and Miss E. Samuel	Lang Lang	55
Jakobi, L. W.	"Granada," Yannathan	80
Kilmany Park Farm Home for Boys	Sale	104
Lawrence, P. H.	"Rainga," Tarrawarra	72
Longerenong Agricultural College		43
McNabb and Son, G. A.	Dooen	
Nancarrow Bros.	Irrewillipe East	154
Northcote Children's Farm	Kerang	52
Onley, W. H.	Bacchus Marsh	156
	"Glenholme," Caldermeade	64
Parker, Mrs. L. M.	Tallarook	56
Payne, A. E. T.	"Yarra View," Lilydale	63
Payne, T. E. N.	"Woodburn," Kilmore	46
Poole, M. A. and D.	Caldermeade	134
Poole, M. A. and D.	Yannathan	72
Powell, T. S.	"Carellen," Mansfield	46
Richardson Bros., Messrs.	"Faldinghurst," Upper Beaconsfield	30
School of Horticulture	Burnley	6
State Experiment Farm	Ruthergien	37
State Research Farm	Werribee	229
Tanner, N. J.	Pakenham	33
Vagg, T. E.	Officedale	45
Wells, W. G.	Caldermeade	65

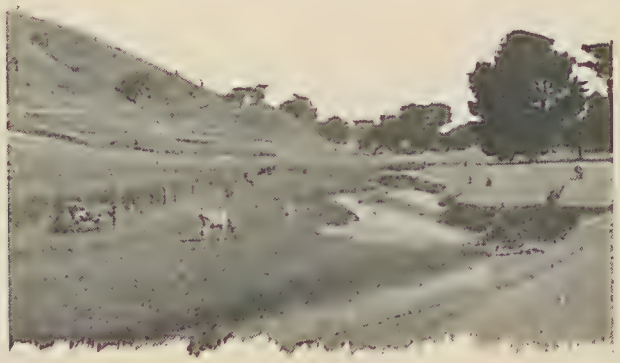
In addition to the above-mentioned, the herds set out hereunder may be considered free of tuberculosis. All these herds have given negative reactions to two or more successive tests conducted by departmental veterinary officers, but inasmuch as replacement cows are only submitted to one test before being admitted to the herds they cannot be considered as accredited under the accreditation scheme which requires, among other things, that no cow shall be admitted to the herds unless it has given two (2) negative reactions at an interval of 60 days, and must be kept in isolation during the period between the two tests.

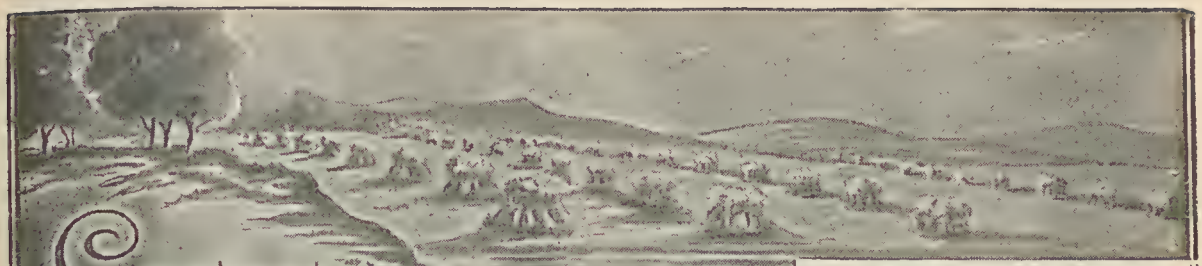
Name.	Address.	Number in Herd at Last Test.
Alexander, Miss R.	Ballarat East	1
Anderson, A. R.	Craigieburn	123
Anderson, J. B.	Warrnambool	19
Andison, J. A.	Thomastown	46
Andrew, T. S.	Whittlesea	91
Andrew, W.	Whittlesea	160
Andrews, E. H.	Templestowe	19
Angliss, Mrs. R.	Ballarat	1
Armstrong, Mrs. M. A.	Sebastopol	15
Artley, A.	Sebastopol	11
Atkinson, A.	Cambrian Hill	21
Atkinson, V.	Cambrian Hill	26
Bailey, Mrs. A.	Doreen	11
Barclay, A. H.	Whittlesea	93
Barker, Mrs. E. M.	Huntly	11
Bates, D. S.	Whittlesea North	25
Batten, R. J.	Wollert	44
Benson, R.	South Morang	35
Bickley Bros.	Wollert	64
Blackmore, P. J.	Ballarat North	57
Blood, J.	Ballarat	8
Bodycoat, A.	Wollert	39
Booth, Mrs. A.	Warrandyte	7
Bourke, G. J.	Fairfield	82
Bourke, J. W.	Somerton	37
Bourke, W. J.	Alfredton	26
Bradbury, A. K.	Diamond Creek	50
Bradbury, G.	Kangaroo Flat	20
Brereton, E.	Kennington	25
Brock, J. N.	Epping	16
Browell, L.	Golden Square	15
Brown, Mrs. A.	Maiden Gully	11
Brown, R.	Kennington	4
Brownhill, C. E. H.	Bundoora	34
Bryden, A. C.	Bendigo	17
Bunting, J.	Craigieburn	34
Bunting, J.	Epping	35
Burke, T. S.	Huntly	19
Butler, W.	Wallan	69
Callaghan, L.	Epping	28
Carr, W. J.	Wollert	62
Cavagna, Miss	Sedgwick	7
Child, G. P.	Epping	54
Christian Bros.	Doreen	42
Clark, H. M.	Nerrina	18
Clark, P. W.	Whittlesea	58
Clemence, S.	Warrenheip	23
Cochrane, C.	Ballarat North	31
Collins, L.	Doreen	48
Cornfoot, D. H.	Whittlesea	43
Coulter, G.	Ballarat North	19
Coulthard, J. J.	Whittlesea	76
Crack, Mrs. E.	Bendigo	12
Craker, Mrs. E.	Warrandyte	2
Cross, G. A.	Mount Rowan	22
Crowle, A. J.	California Gully	16
Cumming, H. R.	South Morang	23
Cunningham, E. C.	Templestowe	23
Cupris, A.	Bullock Creek	31
Danaher, J. V.	Whittlesea	70
Danns, N. C.	Whittlesea	27
David, Mrs. M.	Ballarat	2
Deutscher, H. W.	Mernda	155
Devereux, Mrs. A.	Ballarat	3
Dickinson Bros.	Sebastopol	54
Dillon, L. W.	Epsom	18

Name.	Address.	Number in Herd at Last Test.
Doggett, T.	Kangaroo Flat	17
Douglas, Mrs. J.	Alfredton	52
Downing, J.	Canadian	5
Draper, L. S.	Wollert	31
Drysdale, J. C.	Warrandyte	41
Duke, J.	Ballarat East	1
Dunstan, W.	Pascoe Vale	32
Dwyer, F.P.	Greensborough	40
Eckersley, W. H.	Alfredton	40
Edwards, S. R.	Sebastopol	14
Elford, S.	Magpie	34
Elliott, W.	Elmore	62
English, N. J.	Donnybrook	47
Faderson, J. H.	Mandurang	108
Fergusson, M. A.	Whittlesea	115
Ferres, Mrs. M. E.	Mount Clear	21
Fitzpatrick, W.	Mandurang	9
Fitzsimons, B.	Lower Templestowe	33
Flanagan, A. D.	Epsom	10
Flynn, O.	Epsom	21
Fox, A.	Mernda	68
Franklin Bros.,	Sebastopol	29
Franklin, F. M.	Sebastopol	15
Friswell, H.	Bendigo	42
Galbraith and Walker	Greensborough	31
Gallagher, J.	Golden Square	20
Gallus, E. A.	Doncaster	14
Gamble Bros.	Greenvale	156
Gardiner, A. M., Estate of	Whittlesea	91
Gardiner, C. E.	Epping	29
Gargan, M. J.	Marshall	42
Gentner, H.	Eaglehawk	9
Gerrett, W. T.	Ballarat North	19
Gibbs, C.	Arthur's Creek	30
Gillies, N.	Diamond Creek	32
Goulden, J. B.	Wilson's Reef	54
Graff, Mrs. M. G.	Mernda	21
Graham Bros.	Whittlesea	27
Green, J.	Eppalock	15
Green, W.	Mernda	7
Greer, A.	Wollert	32
Guldice J. J.,	Kangaroo Flat	17
Gunn, A. J. B.	Ballarat	7
Gunn, W.	Kangaroo Flat	10
Hall, Mrs. J. E.	Whittlesea North	13
Hamilton Bros.	Huntly	17
Hancorne, Miss M. R.	Yan Yean	34
Hanrahan, Miss E.	Sebastopol	4
Hanrahan, N.	Sebastopol	6
Hargreaves, W.	Emu Creek	10
Harmer, L. T.	Thomastown	44
Harrison, H. N.	Ballarat	17
Hawkes, Miss D.	Warrandyte	21
Hayes, J. J.	Smythe's Creek	6
Hedges, J. T.	Ballarat	9
Hehr, R.	Wollert	34
Henderson, J.	Donnybrook	58
Henshaw, E.	Lower Templestowe	9
Henshaw, Miss A.	Templestowe	16
Herd, J.	Epping	46
Hewitt, C. J.	Wattle Glen	7
Hewitt, H.	Ballarat	13
Higgs, R. N.	Yan Yean	76
Hilderbrand, P.	Sebastopol	21
Hill, J.	Somerton	86
Hill, W.	Somerton	39
Hogan, Miss M.	Cambrian Hill	20
Hobbs, Mrs. F. J.	Doncaster East	5
Hocking, A. R.	Canadian	12
Houlahan, P.	Eppalock	40
Houlahan, T. J.	Eppalock	43
Howell, G. G.	Wollert	221
Hoy, T.	Kennington	26
Huggins, R. E.	Ballarat	1
Hughes, Mrs. R. E.	Ballarat East	14
Jackson, Mrs. M. A.	Heidelberg	11
Jackson, Mrs. M.	South Warrnambool	6
Janefield Farm	Bundoora	43
Jeffrey, J. T.	Mernda	93
Jenkins, Mrs. A.	Mount Rowan	22
Jenkins, T. H.	Whittlesea	24
Johnstone, Miss J. A.	Mernda	12
Jones, S. E.	Campbellfield	23
Jones, S. G.	Epsom	13
Jukes, C.	Epping	39
Jukes, W. H.	South Morang	28
Junor, G. M.	South Morang	56
Kell, W. E.	Greensborough	28
Kerr, J.	Mandurang	7
Kerwin, H. E.	Eaglehawk	21
Kilpatrick, E.	Mernda	89
Kinnersley, F. and Son	Wendouree	19
Kirkwood, S.	Eaglehawk	12
Knight Bros.	White Hills	42
Knight, G. A.	Sebastopol	29
Knowles, J. T.	Ballarat	3
Lacy, G. C. and Son	Cambrian Hill	32
Lacy, N. C.	Cambrian Hill	13
Lane, J.	Warrnambool	9
Latta, Mrs. J.	Warrnambool	6
Lawry Bros.	Tandara	113
Lehmann, A. H.	Epping	36
Lethlean, S. J.	Epping	27
Levett, E.	Warrnambool	12
Leviston, A. E.	Ballarat East	25
Leviston, G.	Ballarat East	9
Lewis Bros.,	Beveridge	64
Lodington, Mrs. I. E. M.	Ballarat	8
Love, J. E.	Strathfieldsaye	16
McCormack, D.	Woodstock	59
McCulloch, A. A.	Warrnambool	28
McDowell, R. H.	Greensborough	26
McGregor, W. B.	Mernda	44
McKay, J. M.	Wallan	70
McKay, L.	Kal Kallo	12
McKay, Miss E.	Donnybrook	51
McKay, Mrs. H. E.	Ballarat South	10
McKendry, J.	Doreen	69
McKenzie, D. I.	Marong	95
McKernan, A. H.	Whittlesea	35
McKie, J. W.	Wollert	81
McLean, J. F.	Bundoora	32
McManus, D. J.	Napoleons	18
McManus, J. W.	Napoleons	14
McPhee, K.	Whittlesea	106
McPherson, A.	Yan Yean	82
Maltzahn, Mrs. E. N.	Campbellfield	45
Mannes, W.	Strathfieldsaye	39
Martin, Miss A.	Napoleons	21
Martin, Miss G.	Ballarat	11
Martin, W. B.	Ballarat	20
Mason, Arthur	Donnybrook	62
Mason, N.	Donnybrook	52
Matthews. E. S.	Heidelberg	21
Maxwell, J.	Whittlesea	32
Mays, Mrs. A. M.	Doncaster	6
Melling, T.	Kennington	16
Menhennett, F. W.	Sebastopol	21
Mercer, H.	Long Gully	18
Millar, Mrs. G.	Smythe's Creek	51
Miller, A. J.	Whittlesea North	50
Miller Bros.	Greensborough	44
Miller, D.	Epping	42
Morris, C.	Sebastopol	28
Morris, E. J.	Huntly	19
Mortimer, S.	Epping	29
Mosig, H. C.	Epping	26
Murfet, Mrs. S.	Huntly	21
Nankervis, L.	Mandurang	15
Nash, H. A.	Tullamarine	41
Nebel, Mrs. A. E.	Thomastown	36
Nestor Bros.	Wendouree	40
Nickols Bros.	Tandara	72
Noonan, J.	Sedgwick	50
O'Dell, J. E.	Ballarat East	21
O'Donnell, P.	Wendouree	38
O'Hern, T.	Epping	58
O'Keefe, J. P.	Warrnambool	21
Oliver, W.	Campbellfield	72
Olliver, Mrs. S. E.	Ballarat	14
Page, F. J.	Mount Rowan	38
Parker, R. H.	Craigieburn	91
Patullo, F. E.	Mickleham	36
Pearce, A. E.	Mandurang	55
Pearce, J.	Mandurang	24
Pentland, E.	Maiden Gully	8
Pentland, F. C.	Marong	26
Pepper, D. S.	Wattle Glen	38
Phillips, E.	Mt. Pleasant	22
Pilcher, W.	Kangaroo Flat	13
Pitson, R. H.	Yarrambat	19
Pointer, F. A.	Upper Plenty	75
Portingale, J.	Campbellfield	42
Power, L. J.	Mernda	39

Name.	Address.	Number in Herd at Last Test.
Quinlan Bros.	Epping	48
Ramage, J.	Mt. Pleasant	28
Rawlings, J. H.	Whittlesea North	31
Renkin, R.	Ballarat East	11
Richards, T.	Ballarat	29
Richards, W. J.	Warrenheip	20
Roche, Mrs. S. M.	South Morang	79
Rodgers, E.	Whittlesea North	14
Rosewarne, Miss P.	Yan Yean	49
Rowe, Mrs. M.	Eaglehawk	19
Ruff, A.	White Hills	12
Salathiel, R. W.	Big Hill	14
Salau, E.	Strathfieldsaye	12
Scheuffele, C.	Epsom	24
Schreenan, E. and Son	Sebastopol	73
Scott, C. M.	Diamond Creek	49
Seeber, B.	Thomastown	28
Semmens, J. H.	Sedgwick	18
Shaw-Logan, T.	Glenroy	103
Sheahan, J.	Templestowe	30
Shearer, G.	Warrenheip	18
Shearer, J.	Warrenheip	11
Sheeky, A. A.	Templestowe	24
Siebel, F.	Thomastown	29
Smirfitt, J. E.	Epping	52
Smith, F. A.	Invermay	15
Smith, H. H.	Heidelberg	33
Smith, J. R.	Mernda	28
Smith, L. W. W.	Bundoora	81
Smith, M.	Heidelberg	43
Smith, R. A.	Epping	26
Smith, S. E.	Epping	33
Smith, S. H. A.	Yan Yean	17
Sobey Bros.	Napoleons	66
Somerville, A.	Strathfieldsaye	15
Somerville, J.	Strathfieldsaye	14
Somerville, M.	Strathfieldsaye	15
Somerville, P.	Strathfieldsaye	23
Somerville, W.	Strathfieldsaye	48
Southon, H. W.	South Morang	60
Spedding, Mrs. S. A.	Ballarat North	5
Spruzen, G.	Wollert	41
Stacey, R.	Warrenheip	29
Stephens, H.	Epping	53
Stevenson, E.	Wendouree	10
Stimson, T.	Woodstock	34
Story, A. E.	Emu Creek	36
Story, T.	Mandurang	24
Stuart, W. A.	Black Hill	3
Swanton, Mrs. C.	Invermay	41
Thomas, Mrs. E.	Broadmeadows	11
Thomas, J.	Mandurang	39
Thomas, Mrs. V. E.	Yan Yean	31
Thompson, A. E.	Sebastopol	3
Toman, Mrs. A.	Golden Square	15
Toshack, H. J.	Wendouree	38
Towt, C. W.	Glenvale	147
Trahair, R.	Maiden Gully	49
Trethewey, R. T.	Epsom	7
Trethowan, F. W.	Donnybrook	118
Trist, H. P.	Greensborough	8
Troutbeck, H. R.	Mickleham	47
Tuddenham, F. T.	Cherry Tree	19
Tuddenham, M. J.	Cherry Tree	36
Twomey, A.	Greenvale	39
Underwood, N.	Alphington	13
Vallence, C. A.	Epping	19
Van, E. L.	Templestowe	25
Vernon Estate	Cherry Tree	46
Vincent, Mrs. A.	Warrenheip	19
Waller, R.	Ballarat	26
Watkins, F.	Campbellfield	71
Wheeler, W. A.	South Morang	34
Whelpton, B.	Whittlesea North	88
White, L. and S.	Alfredton	53
White, T. L. R.	Alfredton	53
White, W.	Greensborough	17
White, W. H.	Ballarat West	17
White, W. H.	Smythe's Creek	57
White, W. J.	Alfredton	18
Whitelock, E. A. and E. J.	Epsom	23
Whitfield, A. E.	Bendigo	6
Whittingham, E. W.	Greensborough	41
Wicks, C.	Golden Square	18
Wightman, T. A.	Ballarat East	11
Williams, E. A.	Thomastown	32
Williams and Berryman	Bendigo	15
Williamson, H.	Invermay	40
Williamson, J.	Doncaster (High-st.)	4
Willis Bros.	Craigieburn	61
Wilson, J. E.	Diamond Creek	9
Wilson, Mrs. M.	South Morang	12
Wooster, G. S.	Watsonia	23
Wrest, W.	Epping	77
Wuchatsch, J. D.	Epping	17
Yann, R.	Wollert	52
Young, G. T.	Sedgwick	63
Young, J. A.	Sedgwick	39
Young, R. L.	Wollert	26
Young, W. S.	Sedgwick	54
Ziebell, H.	Thomastown	32

There are also 727 herds in which 14,033 head of cattle have passed one test, and may be considered, therefore, to be in process of becoming tubercle-free herds.





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Issued by direction of the Hon. N. A. Martin, M.L.A., Minister of Agriculture.

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POSTAGE RATES

The postage required for this issue is:—To Australia and New Zealand, 1½d.; to United Kingdom, 2½d.; to United Kingdom via All-sea route, 1½d.; to other British Possessions, 2½d.; to U.S.A. and Foreign Countries, 3½d.

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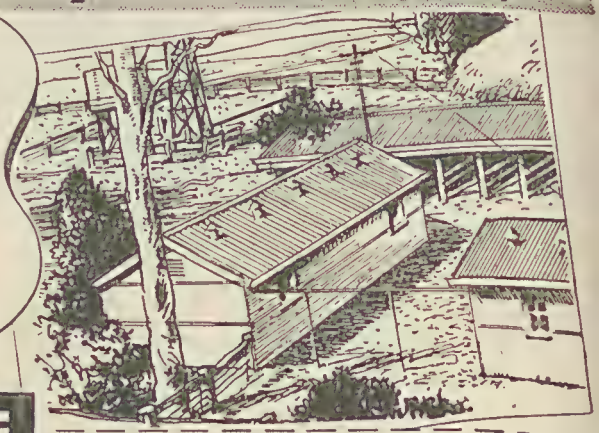

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Wheat as a Solution to the Stock Feeding Problem

By A. C. T. HEWITT, M.Agr.Sc., Live Stock Science Officer

In destroying many thousands of acres of pasture in Victorian grazing and dairying districts, the recent bush fires have caused unprecedented stock feeding problems. In addition to lost pasture many tons of stored fodder have been destroyed, while the State's unburnt reserves of cereal and grass hay are rapidly being consumed by animals from the burnt areas. Most stock foods are in short supply but it is fortunate that there are large stocks of wheat available and these will be used to maintain stock through the autumn and winter.

How to Buy Wheat

IT is cheapest to buy wheat direct from the Australian Wheat Board, 515 Collins-street, Melbourne, at the Board's price of 3s. 6¾d. per bushel delivered to the nearest railway station in truck lots. The respective capacities of 11-ton and 16-ton trucks are 132 and 192 bags.

In all transactions, the Australian Wheat Board requires cash with the order, necessitating an advance payment of 10s. 9d. per bag. After the wheat has been weighed by the Railways or other acceptable authority, any difference between the advance payment and the actual value of the wheat is adjusted between the buyer and the Board. The advance payment for an 11-ton truck will amount to £79 19s., and for a 16-ton truck, £103 4s.

Even before the fires, few farmers had the money to finance truck loads of wheat, few had the shed space to store it or a mill to grind it, and fewer still had all three necessities combined. This position has been aggravated by the fires. Many of the burnt-out farmers are without finance, while their sheds and machinery have been destroyed.

In small quantities wheat, particularly ground wheat, has been expensive and difficult to buy but these problems can be overcome. By organization and co-operative effort an abundance of cheap wheat can be made available in small quantities.

Farmers' Co-operative Companies

The solution is for farmers' co-operative companies to do the job for their clients. The Co-operative Dairy Factories, Produce Stores

and Trading Companies are sufficiently well distributed throughout country districts to service most stock feeders. Where no co-operative companies exist, as in the outer metropolitan area, there is an opportunity to establish them.

Many dairy and other companies have installed gristing mills and are supplying ground wheat at cost to milk and cream suppliers and other clients. In this way a saving of up to 1s. per bushel to the feeder is being effected.

The principal reasons for such a big saving are given hereunder:—

(1) The wheat is railed direct from the station nearest to where it is grown to the co-operative company in the centre of the district where it is to be fed. As there is no break in the journey the freight is low. There is also no possibility of the ground grain being railed back along the route of the whole grain.

(2) The wheat has not to be untrucked and re-trucked after grinding in Melbourne or other intermediate centre.

(3) The company buys in 1,000 bag lots at a concession price (3s. 6d. per bushel) over truck lots (3s. 6¾d. per bushel).

(4) The grain is not handled by any intermediate agent or merchant.

Ground wheat should be distributed at cost. Dairy companies, for instance, should not use profits made from the sale of fodder to increase the price paid for butter-fat. If this were done, the good feeder and the farmer with a large number of pigs and poultry would be penalized.

Feeding Wheat to Dairy Cows

Wheat should be ground to a fairly fine, gritty texture before feeding to cattle or horses.

Although ground wheat may be fed wholly or in part to replace ground barley or pollard on a pound for pound basis in the rations of poultry and pigs, some precautions are necessary when feeding ground wheat to dairy cows, because the ground wheat is apt to run together, and form a doughy glutinous mass. This doughy mass cannot be regurgitated, and may remain in the rumen until it goes bad, causing "food sickness". To prevent this, it is advisable to thoroughly mix the ground wheat with some chaff. This will keep the mixture free and friable. As chaff is scarce and expensive, it may be necessary to use the minimum quantity, which is one pound of chaff to every four pounds of ground wheat. Any type of chaff, including flax boll chaff, may be used for this purpose.

Wheat may not necessarily increase milk and butter production, because it does not contain enough protein. When there is some green pasturage, or where an ample quantity of good lucerne hay or chaff is available, these feeds should provide sufficient protein, although better results will always be obtained by feeding some protein rich meals, such as meat meal or linseed meal with ground wheat.

Where there is no green feed, or good quality lucerne or clover hay or silage, 1 lb. of meat meal or 3 lb. of linseed meal should be mixed with 5 lb. of ground wheat for best results.

An almost ideal ration for a cow producing three gallons of milk daily in a burnt-out area where no other food is available is as follows:—

10 lb. good quality oaten chaff.
12 lb. ground wheat.
2 lb. meat-meal.
1 oz. ground limestone.

As meat-meal is almost unprocurable and as chaff is expensive the three-gallon cow could be fed up to 24 lb. of the following mixture daily—6 lb. chaff, 12 lb. ground wheat and up to 12 lb. of bran, pollard, linseed meal or other common concentrate. If grass hay is available, 2 lb. of grass hay may replace 1 lb. of ground wheat. The need for a protein-rich concentrate is greatly reduced if some short green pick is available as can be expected as soon as there is a break in the weather. As feed grows in the paddock so the quantities of the abovementioned mixtures may be reduced. Where hand feeding is necessary it will be more profitable to keep the cows in production than to dry them off.

Feeding Wheat to Dry Cattle

Dry cattle can be maintained in good condition for long periods on ground wheat containing one per cent. of ground limestone. Without any other food, the average dry cow could be maintained in good condition with careful feeding on 8 lb. of ground wheat per day. To prevent "food sickness," it would be advisable to feed some roughage, giving a thoroughly mixed ration of not more than 6½ lb. of ground wheat and not less than 2 lb. of chaff, although it would be advisable to feed more chaff or hay and less wheat.

Wheat for Horses

When fed to horses, wheat is best coarsely ground and mixed with a proportion of chaff so that the animals will masticate it properly. Also, if ground wheat is not mixed with some coarse foodstuff, it tends to form a paste in the mouth while being eaten, thus reducing the animal's appetite and sticking to the mangers, where it sours and wastes. There is also a tendency to overfeed horses which are given a concentrated ration, such as one containing a large proportion of wheat, since they will have consumed sufficient food for their daily needs before their stomachs are full, and, until horses' stomachs are full, they will have appetites and eat more food. If more is given, the animals will probably become foodsick, or show signs of other digestive disorder. Founder may also result from the overfeeding of wheat. This overfeeding must be prevented by allowing only 3 lb. of crushed wheat for every 5 lb. of chaff displaced from the original ration. Further, horses so fed should never have a full day's ration placed before them, as this will also lead to trouble. If the groom wishes to leave sufficient feed out for his horses, so that he can go away for the rest of the day, he is advised to leave out hay or chaff to prevent overfeeding.

The fallacy that wheat grain should never be fed to horses has probably originated from the troubles associated with uncontrolled methods of feeding. At the State Research Farm, Werribee, the horses are fed shandy chaff (wheaten and oaten hay grown in the same field, mixed together), and frequently crushed wheat is used as the grain supplement to replace oats or crushed barley. Without any pasture or other feed the ration recommended for a medium draught horse at moderately heavy farm work is 22 lb. chaff and 6 lb. oats daily, but when chaff is dear and wheat is cheap, as at present, this ration could be replaced by one containing 12 lb. chaff, 4 lb. oats, and 8 lb. crushed wheat. This ration should be divided into four feeds daily.

For the maintenance of a medium draught horse in a stable or bare paddock a ration of 7 lb. chaff and 7 lb. of ground wheat would be sufficient. As pastures grow these quantities may be reduced.

Feeding Wheat to Sheep

A fire rarely burns sufficiently near the ground to leave absolutely no pick for sheep. Grass seeds and the butts of tussocks usually remain to provide a portion of a sheep's ration. The remainder can be provided by wheat until there is sufficient growth two or three weeks after the first rains.

In connexion with the feeding of wheat to sheep, 4 to 5 oz. per sheep per day is usually sufficient for dry sheep on most burnt pastures. Where there has been a severe burn, up to 12 oz. per day may be necessary. During the first week commence by giving 1½ oz. per head daily for the first two days, then increase the amount by ½ oz. per sheep per day until the full amount it is intended to feed is reached. Any trouble caused by feeding wheat to sheep usually occurs during the first week, when some apparently eat too much before they are used to it.

The wheat, fed whole, should be scattered thinly and quickly on clean hard ground so that all the sheep can feed at once. An excellent idea is to tip the wheat into the box of a truck or cart and spread it on to the ground through a hose inserted into the bottom of the box, as the vehicle is driven round the flock. When wheat is fed for a longer period than one month a lick containing 2 bags of ground agricultural limestone and one bag of salt should be provided for the sheep. Wheat is deficient in calcium and as much of this lick as will be eaten should be provided.

Many sheep-owners have successfully fed sheep in this way for long periods, and assert that once the sheep have become used to it no amount seems to harm them.

Pigs and Poultry

Wheat is by far the cheapest concentrate for pigs and poultry and it may be used wholly or in part to replace bran, pollard, oats, barley and similar foodstuffs in the rations. It must be fed with skim milk or meat-meal for best results and for both classes of stock it may be fed whole or ground.

Self-fed pigs do quite well on whole wheat, but hand-fed pigs do better when the wheat is ground. Lime should be added to ground wheat fed to pigs.

With poultry, whole wheat can comprise the bulk of the afternoon feed while ground wheat can be used to form the bulk of the mash fed in the morning. Poultry obtain their lime requirements from shell grit.

PIG PRODUCTION—
Actual and Required

By L. A. DOWNEY, H.D.A., Pig Expert.

THE following review of pig production is published to bring to the notice of Victorian pig raisers the part they have played in the Australian pig industry in the past and to indicate what is expected of them in the future.

The table sets out Australian and Victorian pig production expressed in tons of carcasses, the quantities having been calculated from statistics issued by the Commonwealth Bureau of Census and Statistics relating to production of pork, bacon, and ham. Some of the more recent statistics are subject to revision.

PIG PRODUCTION AS TONS OF CARCASSES.

Period.	Australia.	Victoria.	Victoria's Percentage of Australian Production.
Year 1937–38 ..	85,867	24,907	29
„ 1938–39 ..	86,838	21,824	25.1
„ 1939–40 ..	96,196	22,236	23.1
„ 1940–41 ..	110,343	28,752	26
„ 1941–42 ..	122,594	28,601	23.3
„ 1942–43 ..	100,654	23,469	23.3
Six months ended —			
December, 1942 ..	50,496	11,630	23
December, 1943 ..	43,131	9,661	22.4

A perusual of the table will show that there was a serious drop in production in the last six months of 1943, as compared with the same period of 1942. Victoria's production was over 16 per cent. lower than that of the corresponding period of the previous year, but the greater part of the Australian deficiency was due to decreased production in New South Wales. Queensland also suffered a decline in production. The three eastern States contribute about three-quarters of the Australian production.

The restrictions on the sale of pork since August, 1943, caused an immediate fall in slaughterings, but production of pig meats during November and December, 1943, should have included, not only the normal quantity of baconer meat, but also production from pigs which were compulsorily carried on from porker weights to baconer weights. However, the production in Australia and in Victoria during November and December, 1943, was lower than in the corresponding period of 1942, as is shown in the following table :—

MONTHLY PRODUCTION OF PIG MEAT AS TONS OF CARCASSES.

Month.	Australia.		Victoria.	
	1942.	1943.	1942.	1943.
July ..	8,356	8,341	1,897	1,824
August ..	8,051	6,678	1,719	1,274
September ..	8,136	5,757	1,748	1,117
October ..	8,561	6,316	2,011	1,432
November ..	8,061	7,936	1,960	2,033
December ..	9,331	8,103	2,295	1,981
Six months ..	50,496	43,131	11,630	9,661

In September, 1943, production goals were allotted in accordance with estimated minimum requirements of pig meats. The Australian goal for 1944 was 143,000 tons of pig carcasses, and Victoria's goal was 30,000 tons. A substantial increase in weight and numbers of pigs is necessary if the goal is to be achieved.

During the next few months when the supply of milk for pig feeding will be low, farmers may maintain their pig production by rationing the available milk and using more wheat in their pigs' diet.

As little as half a gallon of separated milk daily for each pig from weaner to baconer stage will suffice to balance all the wheat the pigs can eat.

The most economical way to purchase wheat is in railway truck lots, direct from the Australian Wheat Board, 515 Collins-street, Melbourne. In this way wheat may be landed at purchaser's railway station at not more than 3s. 6¾d. per bushel.

CEREAL TRIALS IN THE MALLEE

By H. J. SIMS, M.Agr.Sc., Dip. Com., Manager, and C. G. Webb, M.Agr.Sc., Science Field Officer, Mallee Research Station, Walpeup

WHILE the practice of holding annual field days at the Mallee Research Station, and at the various plots on farmers' properties, has been discontinued during the war, it has been the policy to continue with as much experimental work as the restricted staff position will allow. It has been necessary to defer many experiments, and to discontinue some of the associated plots, but those on the farms of A. E. Barbary, Woomelang, T. W. Atkin, Ultima, and J. T. Drury, Berriwillock, have been maintained.

At present, the main experiments, both in wheat and oats, deal with the production and testing of new varieties for yield, disease resistance and other agricultural characteristics, and the carrying out of manurial, cultivation and rotation trials.

The season just concluded was one of the worst experienced since the establishment of the Research Station. During the last six years the Mallee has experienced three droughts, the seasons 1938, 1940 and 1943 each having a rainfall of less than 10 inches. In 1943, the autumn and winter were particularly dry. In some localities, heavy showers gave those centres a good start, while on other places, including Walpeup, good spring rains were received. Thus, on the whole, most districts harvested at least seed requirements, although many individual farmers had to obtain their seed from neighbours or adjoining districts. Seasonal conditions were most adverse in the Millewa, where no harvest at all was obtained. In all districts crops on sandy ground gave much better returns than those on heavier land; although in some cases, crops on very sandy land were severely battered by the winter dust storms. The monthly rainfall at Walpeup over the last six years, and the average for 32 years, are given in the next column.

Month.	1938.	1939.	1940.	1941.	1942.	1943.	Average 32 years, 1912–43.
January ..	125	13	38	358	36	61	70
February ..	49	343	58	12	89	15	85
March ..	..	12	19	99	5	10	74
April ..	81	222	145	16	80	99	78
May ..	2	135	23	9	182	31	119
June ..	36	183	14	185	206	73	131
July ..	167	87	92	161	218	63	117
August ..	51	150	36	61	232	132	133
September ..	6	47	135	148	64	151	136
October ..	8	37	17	253	116	150	139
November ..	9	196	76	95	116	82	90
December ..	2	3	48	73	30	72	92
Total	536	1,428	701	1,470	1,374	939	1,264
Rainfall, April–October ..	351	861	462	833	1,098	699	853

Cereal Breeding

With the reduced man-power available on farms it is most important that the greatest return be obtained from the use of this man power. The sowing of the most prolific varieties, together with efficient cultivation of the land, will enable this to be done.

The production of new superior varieties of wheat and oats by hybridization and selection, and the subsequent development and testing of these forms, provide one of the most important and extensive aspects of the research work being conducted at the Mallee Research Station. Each year, a large number of matings of desirable parents is made, and the progeny of these are grown and studied in nursery rows in the stud cereal plots. These rows are subjected to a drastic culling, and only those plants exhibiting desirable characteristics are retained for further selection and testing.

This selection work is continued for a number of years, until only a few of the most promising true-breeding strains are left. These strains are grown in seed multiplication plots,

and finally pass to the larger field plots for accurate testing to determine their yielding capacity. At an early stage all crossbreds are tested also for disease resistance and baking quality. Thus it takes ten years or more to produce a new variety and have it ready for distribution to farmers.

Wheat Variety Trials

In this section, standard varieties and promising new crossbreds are tested, both at the Research Station and at the associated farmers' plots. The results of these trials are summarized in Table I.

In addition to the above-mentioned varieties, new varieties from other States are tested at Walpeup as soon as seed is obtained. It is necessary to try these varieties over a period of years. Some, e.g., Javelin from South Australia and Kondut from Western Australia, have shown considerable promise in their first year's trial.

Each year, the Victorian Wheat Advisory Committee, which includes representatives of wheat growers, merchants, millers, bakers, and the Victorian Department of Agriculture, considers the results of varietal trials, together with reports on disease resistance flour quality investigations, and general field behaviour, and makes recommendations for district sowings. The Mallee recommendations are:—

——	General Sowing.	Limited Sowing.
Mallee (Northern) ..	Regalia Ranee 4H Ghurka Bencubbin	Pindar Baldmin
Mallee (Southern) ..	Ghurka Ranee 4H Regalia	Pindar Bencubbin Quadrat Baldmin Dundee

All the above-named varieties are now either well known, or are becoming well known throughout the Mallee. Ranee 4H and Ghurka have been two standard wheats for years, and need no further comment. Bencubbin and Regalia also can now be regarded as standard varieties, and both are steadily gaining in popularity.

The straw weakness of Bencubbin does not allow of it being sown on too large an area, but farmers have adjusted their sowing to allow for this. Also, owing to its tall straw Bencubbin is a useful dual-purpose (hay and grain) variety. Baldmin also has demonstrated its yielding ability, and it also produces flour of better quality than the other recommended varieties. However, the straw weakness of this variety restricts its use to

TABLE 1—WHEAT VARIETY TRIALS IN THE MALLEE.

Yields in Bushels per acre.

——	Walpeup.	Mallee Research Station.			Woomelang.		Ultima.		Berriwillock.		Werrimull.	Swan Hill.
	Average 18 years, 1925–43.	Average 2 years, 1942–43.	Average 4 years, 1940–43.	Average 7 years, 1937–43.	Average 2 years, 1942–43.	Average 4 years, 1940–43.	Average 2 years, 1941&43.	Average 3 years, 1941–43.	Average 2 years, 1942–43.	Average 5 years, 1940–43.	Average 5 years, 1937–41.	Average 3 years, 1937–39.
Ranee 4H	23·6	18·1	20·0	24·8	31·4	20·8	11·5	10·8	21·8	18·5	11·5	27·7
Regalia	..	17·5	20·3	25·2	31·4	21·3	11·1	11·5	21·4	18·2	12·0	27·6
Bencubbin	..	16·8	20·8	25·7	32·0	21·8	10·9	11·2	..	..	11·7	27·7
Baldmin	..	15·5	19·6	25·3	30·9	21·0	9·6	9·8	..	..	10·9	27·6
Bobin	..	18·0	20·0	..	29·8	20·8	12·0	11·1	..	..	..	..
Ghurka	22·8	17·8	19·2	22·4	24·4	16·2	11·2	9·6	21·2	19·1	10·1	26·9
Pindar	..	17·9	20·2	24·9	23·9	16·8	10·8	9·3	20·9	19·5	10·5	28·1
Quadrat	..	19·6	21·1	26·2	26·0	17·8	11·7	9·6	23·6	21·2	..	..
Ghurka x Ranee M6173	..	19·4	22·4	..	32·2	..	11·6	11·6	23·7	..	..	..
Ghurka x Ranee M5174	..	18·1	21·8	..	30·4	..	..	..	..	..	..	..
Ghurka x Pura 4 V9.2	..	18·0	20·6	..	27·2	..	..	..	..	..	..	..

Note.—The yields per acre quoted in this statement are those actually harvested from the plots. Such yields are considerably higher (up to 20 per cent.) than would be the case if it were not necessary to have paths between the plots.

A view of the permanent rotation field at the Mallee Research Station

limited sowings only. Dundee produces a wheat of better than average flour quality, although its quality is likely to be variable, and in yielding ability it is below the other varieties. Pindar and Quadrat are the two latest varieties to be named by the Victorian Department of Agriculture. Pindar was first released from the Mallee Research Station in 1941. It is a selection from Ghurka. Slightly taller and earlier than its parent, this variety is a distinct improvement insofar as flour quality is concerned. Furthermore, the grain is larger and more attractive. Its yield has been good in the Mallee, where it has consistently outyielded its parent. It is similar to Ghurka in disease resistance and field characteristics. Quadrat, the result of a cross between Ghurka and an unnamed crossbred, Currawa x Major x Gallipoli, was first released for Wimmera conditions. However, it has yielded well in the southern and central parts of the Mallee. It is of the Ghurka type, being slightly taller, and has a bolder head. It has desirable field characteristics and disease resistance. Its grain quality is comparable to that of Ghurka; but it has consistently outyielded that variety in all parts of the State.

Wheat Manurial Trials

In the past, one would examine a table of results from a manurial trial to ascertain the optimum dressing to apply. Unfortunately, owing to wartime conditions, our main supplies of phosphate rock have been cut off, and it has been necessary to ration available supplies. Now, one examines the results to find out how to make best use of the fertilizer available. It will be seen that the biggest increase in yield is obtained from the initial application of superphosphate and that subsequent increases give reduced increases in yield. Therefore, with the limited amount of superphosphate available, it is best to try to sow all the area with the minimum quantity the drill will sow, rather than to sow portion of the area at the normal pre-war rate, and the remainder without manure.

TABLE 2.—WHEAT MANURIAL TRIALS IN THE MALLEE.

Yield in bushels per acre.

Treatment.	Mallee Research Station.	Woomelang.	Ultima.	Berriwillock.
	Average 12 years 1932–43.	Average 4 years 1940–43.	Average 2 years 1941 and 1943.	1943 only (drought)
No manure	21·8	13·9	9·2	8·6
Super., 30 lb. per acre	24·3	15·2	10·4	9·6
Super., 60 lb. per acre	25·7	16·2	10·6	8·8
Super., 90 lb. per acre	26·4	16·2	11·8	8·8
Super., 120 lb. per acre	27·0	16·2	11·9	..

Cultivation and Rotation Trials

Cultivation trials were commenced at this Station in the season 1933-34, and were continued in large plots for six years. These plots

were then replaced by smaller plots on permanent sites. The cleaner fallows show up to advantage in drought years, or partial droughts, while there is less difference due to cultivation in good years. Average yields are shown in Table 3.

TABLE 3.—WHEAT CULTIVATION TRIALS, WALPEUP.

Yield in bushels per acre.

Treatment.	Average 6 years, 1934–39.	Average 4 years, 1940–43 (permanent sites).
Deep fallow	21·6	21·4
Normal fallow	20·9	20·5
Late fallow	20·5	17·0
Sheeped fallow (not cultivated in autumn) ..	18·6	16·3
Non-fallow	14·8	11·6
Scarified fallow	..	19·3
Intensely worked fallow ..	..	20·7
Fallow, scarified early, ploughed late	..	20·5

All plots sheeped in standard manner as required.

Unfortunately, the cleaner fallows are more subject to soil drift than those left in a rougher condition. Drift is reduced in the plots scarified early and ploughed late. Also the working in of straw or grass materially assists in reducing the evil. The sowing of a cover crop on the fallow has been another method suggested to help minimize this loss of soil from fallows. Such a cover crop is sown at the first working of the fallow, i.e., about August. A light rate of seeding is adopted, and the subsequent growth is grazed judiciously to prevent seeding, and at the same time to leave sufficient cover to prevent serious erosion. Such treatment of a fallow will give reduced yields in dry years; but in good years, the reduction in yield is not serious, and would be compensated for by the sheep feed obtained.

Over a seven-year period 1937-43, cover-crop fallow yielded an average of 17·2 bushels per acre in comparison to normal fallow 18·1 bushels per acre.

A comprehensive rotation trial, involving thirteen different crop rotations of 2, 3 and 4 years' duration, was commenced in 1937. Owing to the time necessary to test out the effects of different rotations, no results are yet available.

Cereal Diseases

Research work concerning several cereal diseases has been carried out in the past; but during the past few years work has been confined to investigations concerning the varietal resistance of new wheats and crossbreds to flag smut. All important wheats and many crossbreds have been classified according to their resistance to the disease. The following table classifies the common varieties:—

Very Susceptible	Baldmin Federation Regalia Free Gallipoli Magnet Mogul	Moderately Resistant	Currawa Gular Ghurka x Ranee M6173
Susceptible	Ranee 4H Bobin Rajah Sepoy	Resistant	Ghurka Dundee Quadrat Pindar Nabawa Bencubbin Warigo

The use of resistant varieties is the most satisfactory method of control where flag smut has previously caused losses on the farm, or has been noticed in the past.

Oat Variety Trials

The majority of oat crops in the Mallee are sown on stubble land, and the main trials at Walpeup are therefore on wheaten stubble land. At the associated farmers' plots the trials are on fallow.

Experience has shown that it is desirable to sow more than one variety of oats to enable maximum advantage to be taken of seasonal conditions each year. Also, it enables the oat harvest to be spread over a longer period. In those years when late rains are experienced, the late varieties yield best; but if these rains do not arrive, as so often happens in the Mallee, earlier maturing varieties will do better than the standard Algerian. There is little doubt that larger areas of these early varieties could be sown with advantage in the Mallee, particularly in the northern portions. If it is essential that some hay be cut each year, it is advisable to sow a portion of the area of oats on fallowed land. Results of variety trials for hay are shown in Table 4.

TABLE 4.—OAT VARIETY TRIALS IN THE MALLEE—HAY YIELDS.

Yield in cwt. per acre.

Variety.	Sown on Stubble Land.			Sown on Fallow Land.			
	Mallee Research Station.			Mallee Research Station.		Woomelang.	Ultima.
	Average 2 years 1942–43.	Average 6 years 1938–43.	Average 12 years 1932–43.	Average 2 years 1942–43.	Average 4 years 1940–43.	Average 2 years 1942–43.	1943 Only.
Mulga	10·9	17·2	20·7	23·6	25·6	45·7	11·4
Dawn	12·8	17·7	21·8	23·4	26·6	32·9	15·1
Algerian	12·0	16·7	20·3	19·5	22·6	33·6	14·6
Algeribee	13·5	18·1	..	21·0	24·5	34·6	16·5
Belar	11·1	..	..	21·7	..	..	15·2
Fulghum	11·6	16·4	..	23·6	24·2	35·8	14·5
New Zealand Cape	12·5	..	..	21·5	..	..	..
Pal x Dawn R4–1–1	10·6	17·0	..	22·8	24·1	41·4	11·8
Pal. x Dawn W8103	11·1	..	..	23·7	25·3	39·2	12·8

It will thus be seen that the earlier varieties, Mulga and Dawn, over a long period, have outyielded Algerian. Algeribee, a new selection of this variety, has also outyielded its parent, and most other varieties as well, over the period in which it has been tested.

In respect to grain yields, little difference is apparent between the standard varieties over a period of years, although there are quite big seasonal differences, depending on the season. The results shown in Table 5 are from plots that have not been grazed.

The Mallee Research Station plots were sown on stubble land, while those at Woomelang and Ultima were on fallow. Also at Woomelang, some varieties—Palestine x Dawn W8103, Fulghum and Mulga—shook somewhat in some years. Oats are very difficult to harvest satisfactorily. One windy day when they are nearly ripe can cause considerable damage. In plots, early varieties are at a disadvantage owing to their earlier ripening and the necessity of having to stand longer, and this may also happen in the paddock. It is in this respect particularly that the advantage of growing oats with different ripening periods is most apparent.

Oat Grazing Trials

Oats, as hay or grain, form a most suitable fodder reserve for Mallee farmers. During the past fifteen years increasing quantities of oats have been sown for sheep feed—either for complete grazing, or for a recovery yield after

TABLE 5.—OAT VARIETY TRIALS IN THE MALLEE—GRAIN YIELDS.

Yields in bushels per acre.

Variety.	Mallee Research Station.			Woomelang.	Ultima.
	Average 2 years 1942–43.	Average 6 years 1938–43.	Average 10 years 1934–43.	Average 3 years 1941–43.	1943 Only.
Mulga	10·4	15·8	16·6	15·8	12·8
Dawn	14·7	15·7	16·3	17·1	13·1
Algerian	12·4	15·7	16·3	15·5	18·8
Algeribee	13·2	16·0	..	17·8	15·0
Fulghum	12·5	16·2	..	16·1	13·4
Belar	10·6	..	..	..	13·8
New Zealand Cape	12·4	..	..	..	..
Pal. x Dawn R4–1–1	11·6	18·3	..	21·4	15·6
Pal. x Dawn W8103	12·8	..	..	13·9	14·1

General view of experimental plots at the Mallee Research Station.

an early grazing. In this case they provide good early feed, and if thought desirable, the recovery crop can be left unstripped and used for summer feed for stock.

At Walpeup, all oats in "Senior Trials" are tested both for complete grazing and for their recovery power after one grazing. The power of an oat variety to recover after grazing is determined largely by the time that the oat stays in the "grassy" stage. Those varieties that run up to head quickly recover poorly after grazing at this stage as the main stools are damaged; but grazing while in the "grassy" stage does not affect these main stools. If a grain yield is desired, sheep should be removed when the plant commences this upright or stemmy growth. For oats sown in May, at Walpeup, this takes place about the third week in July for early varieties, and about a month later for the prostrate (Algerian type) varieties.

It will be seen that the yield of all varieties is seriously reduced by grazing, those with the best recovery after grazing being Fulghum and the Palestine-Dawn crossbred R4-1-1. In the completely grazed section, three grazings are obtained in July, early September and October (approximately), the exact times depending on seasonal conditions.

In grazing trials, rate of seeding is most important; much more greenstuff being obtained from the heavier sowings. As oats vary so much in their grain size, it is necessary to adjust the rate of seeding according to this grain size. Grazing and recovery trials are sown at a heavier rate than hay and grain trials, the respective rates being about 50 and 70 lb. per acre.

TABLE 6.—RECOVERY YIELD OF OATS AFTER GRAZING MALLEE RESEARCH STATION.

Variety.	Average Yield 2 Years 1942–43.			Average Yield 6 Years 1938–43.		
	Greenstuff July cwt./ac.	Grain Ungrazed bus./ac.	Grain Grazed bus./ac.	Greenstuff July cwt./ac.	Grain Ungrazed bus./ac.	Grain Grazed bus./ac.
Mulga	8·4	10·4	5·8	14·8	15·8	7·3
Dawn	7·5	14·7	7·1	14·4	15·7	7·7
Algerian	5·8	12·4	7·0	12·1	15·7	8·3
Algeribee	5·9	13·2	7·3	13·2	16·0	8·1
Fulghum	8·0	12·5	7·2	14·6	16·2	10·9
Belar	6·5	10·6	7·9	..	..	..
New Zealand Cape	5·9	12·4	7·4	..	..	..
Pal. x Dawn R4–1–1 ..	7·4	11·6	7·2	14·9	18·3	10·4
Pal. x Dawn W8103 ..	9·2	12·8	7·1	..	..	..

Fodder reserves at the Mallee Research Station, November, 1943. The stack in the foreground was built in 1942.

If seed of the aforementioned early varieties is not available, other varieties that would be suitable are Guyra, Belar, or Gidgee.

Mulga is a selection from Sunrise, and is a tall-growing early-maturing oat. The early growth is erect, and the stooling is sparse. The grain is a creamy-brown colour. Dawn, also a selection from Sunrise, matures later than Mulga. The early growth is also erect, but with better stooling than Mulga. The straw has a nice purple colour, and the grain is dark brown—often very dark in colour. Algeribee is a selection from Algerian. It differs from its parent in that it usually has a little more upright early growth and is a few days earlier in ripening. The grain is of a medium to dark-brown colour. This selection has proved superior to Algerian in practically all Mallee trials. Algerian has been the standard Mallee oat, and needs no further description. Fulghum is an importation from America. It has vigorous, rather prostrate early growth, good stooling ability, and a long "grassy" stage, and consequently recovers well after grazing. Unfortunately, it is very weak in the straw.

TABLE 7.—OAT VARIETY TRIALS—COMPLETE GRAZING—MALLEE RESEARCH STATION.

Yields in cwt./acre, 80 per cent. moisture. Average Two Years 1942-43.

Variety.	First Grazing (July).	Second Grazing (Sept.).	Third Grazing (Oct.).	Total Grazings.
Pal. x Dawn W8103	9·2	7·0	8·0	24·3
Fulghum	8·0	6·2	9·1	23·3
Pal. x Dawn R4–1–1	7·4	6·9	8·8	23·1
New Zealand Cape	5·9	7·4	9·0	22·4
Mulga	8·4	6·4	6·8	21·7
Dawn	7·5	6·0	8·0	21·6
Algeribee	5·9	6·1	9·6	21·6
Belar	6·5	6·0	9·0	21·6
Algerian	5·8	6·2	9·2	21·2

Oats can be utilized in so many ways that no one variety will meet all purposes in all years. Bearing in mind what has been said in the foregoing concerning the spread of varieties, the following table sets out the varieties recommended for Mallee sowing—

For hay and grain—
- Mulga (early maturing)
- Dawn (midseason)
- Algeribee (late maturing) if seed available, otherwise Algerian.

For grazing and recovery—
- Fulghum
- Dawn
- Algeribee or Algerian
- Mulga (for early grazing only).

Visitors and Inspections

Although it has not been possible to hold field days since the war, the Mallee Research Station is open to inspection at any time, and visitors are welcome. In addition to cereals, the work of the station deals with pastures, sheep, and sand drift. The free discussion on matters of agricultural importance between the staff of the Station and farmers assists the Department in planning that its experimental work shall be of maximum benefit, and helps the producer to appreciate the value of the investigations already carried out. Arrangements for visitors to be conducted over the Station may be made with the Manager.

Barley Production—1944-45

THE Australian Barley Board has notified the Department of Agriculture that the plan for guaranteeing of quotas to barley growers from the 1944–45 crop has been completed. The Commonwealth production goal for the season has been fixed at 11,000,000 bushels, of which 2,680,000 bushels will be obtained from Victoria. The following minimum first advances at delivery centres are guaranteed to growers under contract to the Board:—

—	Two-row Barley.	Six-row Barley.
	s. d.	*s. d.*
Malting Grade	3 6	3 0
Feed Grade	2 0	1 8

It is proposed that quota contracts will be allotted to growers based on the average deliveries of the seasons, 1939–40, 1940–41, 1941–42. The Australian Barley Board has a record of all deliveries by growers, and it is intended that the growers should complete questionnaire forms before the quota is allotted. It is proposed that the following procedure shall be adopted:—

A questionnaire form will be issued to each grower who delivered barley during any one of the three years mentioned.

Before issue the Australian Barley Board will arrange for the name and address of the grower, and the average delivery of 2-row and 6-row barley to be recorded on each questionnaire form.

The questionnaire forms will be posted direct to growers.

The Australian Barley Board will issue the questionnaire forms by the end of February, 1944. The statement of advances should be detached and retained by the grower.

In the case of share farmers the questionnaire forms should be completed only by the owner or lessee of the property.

A share farmer who is not the owner or lessee of the property should write across the form the name of the owner or lessee and should not answer any of the questions, and the questionnaire form should be returned to the Australian Barley Board for record purposes.

Any questionnaire form issued in the name of a grower who delivered barley during the three years, but who is now deceased, should have endorsed across it the words, "Deceased—farm now worked by..... of....." The questionnaire form should then be returned to the Australian Barley Board, when another will be issued in the name of the new owner.

The questionnaire form issued in the name of a grower who delivered during the three years mentioned and has now sold his farm, should have endorsed across it the words, "Farm sold to..... of.....". The questionnaire form should then be returned to the Australian Barley Board for the issue of another questionnaire form to the new owner.

The questionnaire form is being prepared so that it will be necessary only to fold the form, seal it, and affix a 1½d. postage stamp to the form, which has already been printed, with the address of the Australian Barley Board.

Fire Damaged Superphosphate Still Valuable

One of the minor results of the recent disastrous fires in the Western District was the apparent destruction of stocks of superphosphate stored in out-buildings which were burnt out. Some farmers have felt that such superphosphate, now in a shapeless heap, was so damaged as to be of no further use. Such, however, is not the case as the fertilizer still retains nearly its original fertilizing value, and should, by no means, be discarded. As a result of the fire, the water soluble phosphoric acid may be slightly reduced by reversion to the citrate soluble form, but the total phosphoric acid is not lessened, and the material retains almost full superphosphate value. It may have caked and may require breaking up or grinding before use. Such burnt superphosphate, therefore, should be carefully salvaged and put under cover before it can be damaged by heavy rain.

[W. R. JEWELL, M.Sc., Agricultural Research Chemist.]

POULTRY LAYING HOUSES

PLANS AND SPECIFICATIONS

By MARTIN D. HALL, Assistant Poultry Expert

A well-planned commercial poultry farm with houses facing north and downhill.

ENVIRONMENT is an important factor in the growth and development of all living things. Experienced poultry farmers have long recognized it as exercising a marked influence upon economical poultry and egg production. The hen of finest pedigree fed upon a correctly balanced ration will hardly be capable of producing the results expected unless she has an environment favorable to such a performance. Therefore, the fundamental purpose of a poultry house is to promote the comfort and health of the stock in the house, and to shelter them from unfavorable climatic conditions.

The difficulties one would encounter in laying down hard and fast rules in regard to housing are obvious. Therefore, any general rule or system must be flexible enough to fit in with varying conditions.

The following recommendations are compiled with this end in view and are based on results obtained by poultry farmers throughout Victoria.

Essential Features of a Laying House

A laying house is a long-term investment, and should contain all features necessary for the comfort of the birds, and also to enable the owner to carry out his duties in the pens quickly and efficiently.

The house should be constructed on sound practical lines, and similar in design to those used by experienced poultry farmers throughout the State. The most important features of a laying house are light, space, ventilation, and sanitation.

Light is necessary for the health of the birds, and also to induce the greatest activity during the day.

Space must be provided to give the birds enough room to exercise themselves as an aid to general good health and satisfactory egg production.

Ventilation should be arranged so as to admit an abundance of fresh air without draughts. Impure air is an indirect cause of

bad health among poultry. Dry, sanitary conditions are indispensable to a well-constructed laying house, and a flow of air through the house helps to produce these conditions.

Site

A northerly aspect for the poultry house is most desirable, provided it is not too exposed. Such an aspect will ensure that the birds will receive plenty of sunlight during the winter months. Laying houses should face downhill to allow for a natural drainage away from them, leaving the pathway along the front dry and clean.

Surface water and seepage is taken up and carried away by the open gutters, which should be situated approximately 3 feet away from the back of the row of sheds on the downhill side. This is to prevent seepage into the sheds on the lower level, which is likely if the gutters are placed too close to the back of the houses, particularly if the soil is light and porous.

Wind protection is desirable, and existing trees should be preserved and worked into the general scheme in order to provide protection without excluding direct sunlight. If there are no trees or shrubs on the property, suitable varieties should be planted to provide the greatest amount of protection without causing any obstruction.

The distance between each row of laying houses will depend upon conditions, such as the area of land, the slope, and the number of birds to be kept.

When large flocks are intensively housed, it is wise to allow a 20-ft. space at least between each row, to permit fresh air to circulate freely through the sheds during hot weather. On the other hand, when the houses are placed too far apart, a considerable amount of extra time and labour is involved in attending to the birds.

Size of Houses

Laying houses, measuring 20 feet deep and in length varying from 80 feet to 200 feet long, divided into 20-ft sections, each accommodating 100 birds, are used on the majority of poultry farms in Victoria. Sheds of this size give satisfactory results, are easily worked, and are economical to build. Overcrowding must be avoided, as it is unprofitable and dangerous to the health of the birds. When birds are run in smaller pens more floor space per bird is required than in the standard 20-ft. by 20-ft. pen if best results are to be obtained. Four square feet per bird is the figure on which the number of birds to be housed in the standard pen is calculated. Each bird, however, has the range of the whole pen, or a total of 400 square feet. Space allotted a flock of six birds on the basis of 4 square feet per bird would provide a range of 24 square feet only, an

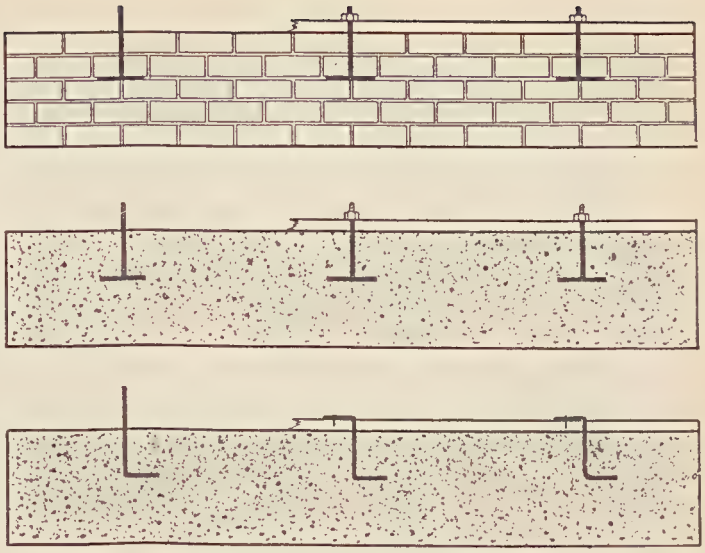
The "20-ft." laying house in five sections.

inadequate area if health and production are to be maintained. It is recommended, therefore, that birds kept in small pens should be allowed a minimum of 6 square feet per bird. Any additional space provided would be an advantage.

Foundations and Floors

The three different types of foundation dealt with in this article are stumps and sole plate, concrete, and brick.

Stumps and sole plates are probably the cheapest and most easily installed foundation, but are not proof against rats, unless materials such as sheet iron or fine-mesh wire-netting are placed around the outside to a depth of at least 18 inches below ground level. Concrete, although more costly than these materials, is worthy of consideration when laying houses are being constructed, as it is both durable and rat-proof, and also tends to prevent underground seepage from passing under the pen floors. The concrete footing should be approximately 4 inches thick and 18 inches deep.



Three types of foundation.

Top—Brick: Bolts are cemented between bricks and inserted through wall plate, which is held in position with nuts. Middle—Concrete: Bolts are fixed in concrete as it is being poured. The wall plate is held in position as shown. Lower—Concrete: Stout fencing wire is fixed in concrete with the ends through wall plate, then bent and fastened with a staple.

Brick foundations are satisfactory, and can be quickly laid by an experienced brick worker. They, also, should be laid to a depth of 18 inches below ground level, as a prevention against rats.

Concrete floors and foundations may be constructed by using two different methods. The usual method is to pour the walls of the foundation first, and later the floor. The floor, however, may pull away from the foundation wall, and leave a crack all round.

The second method is to pour both the foundation and the floor together, giving an unbroken mass of concrete from one foundation to the other. When earth filling is used to level the floor base, this should be firmly rolled or tamped, or left exposed to the weather until it has thoroughly settled down, in order to prevent damage to the floor. On heavy clay soils the surface should be topped with 1½ to 2 inches of sand, fine gravel, or ashes, to ensure a sound dry floor. In a laying house 20 feet deep it is an advantage to give the floor a slope of 3 inches from rear to front, and to make it approximately 4 inches higher than the ground outside the house.

It is advisable to keep from 4 to 6 inches of scratching material on the floor of the house. This should be cleaned out and replaced at least every three months.

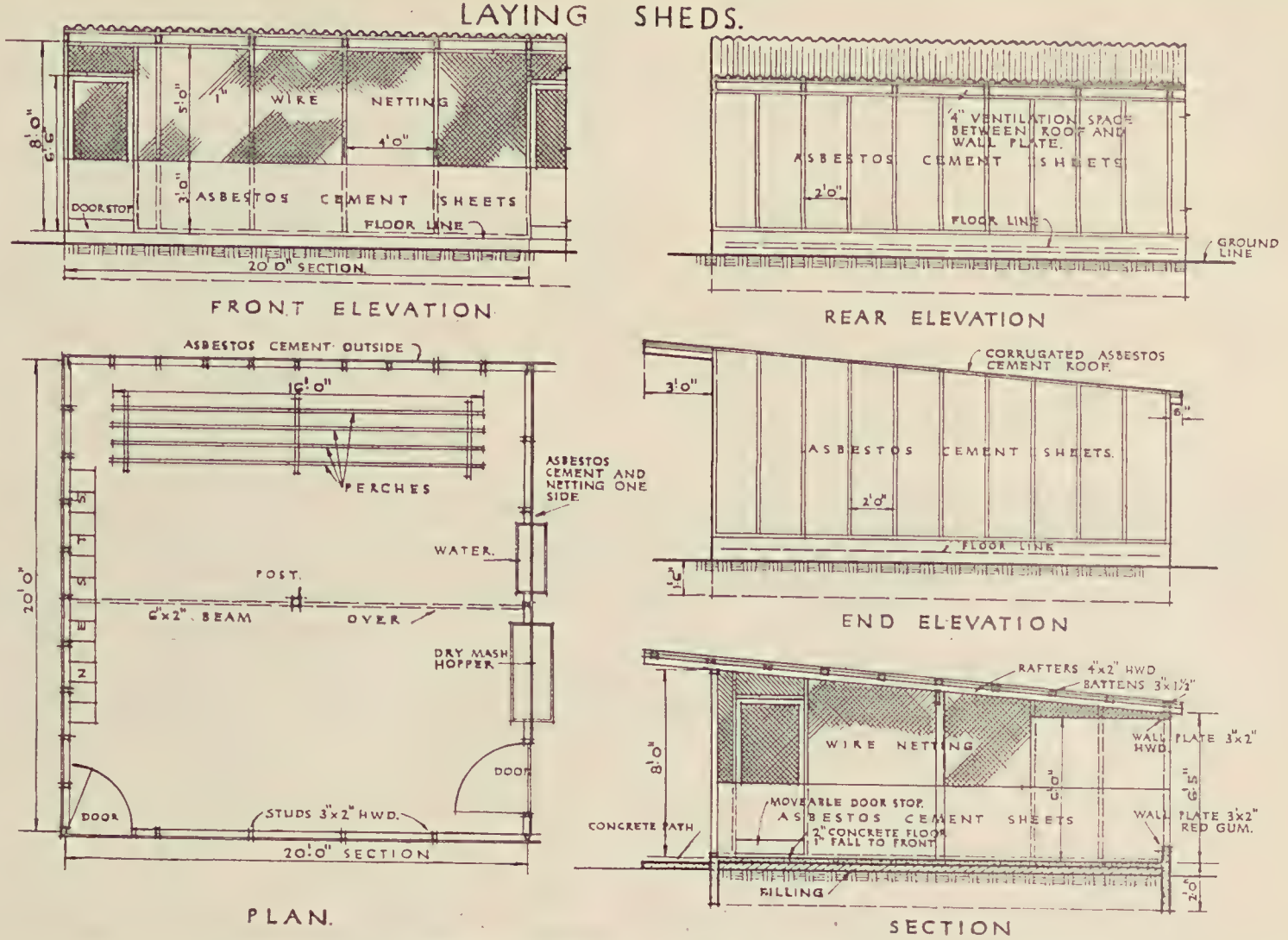
Ventilation

It is most important to provide ventilation at the back of the house. It will be noticed in the plans that there is a 4-in. space between the top wall plate and the roof batten. A weatherboard can be hinged to the wall plate, and in hot weather it may be opened to allow a current of air to flow right through the building under the roof. This air will lower the temperature of the house considerably.

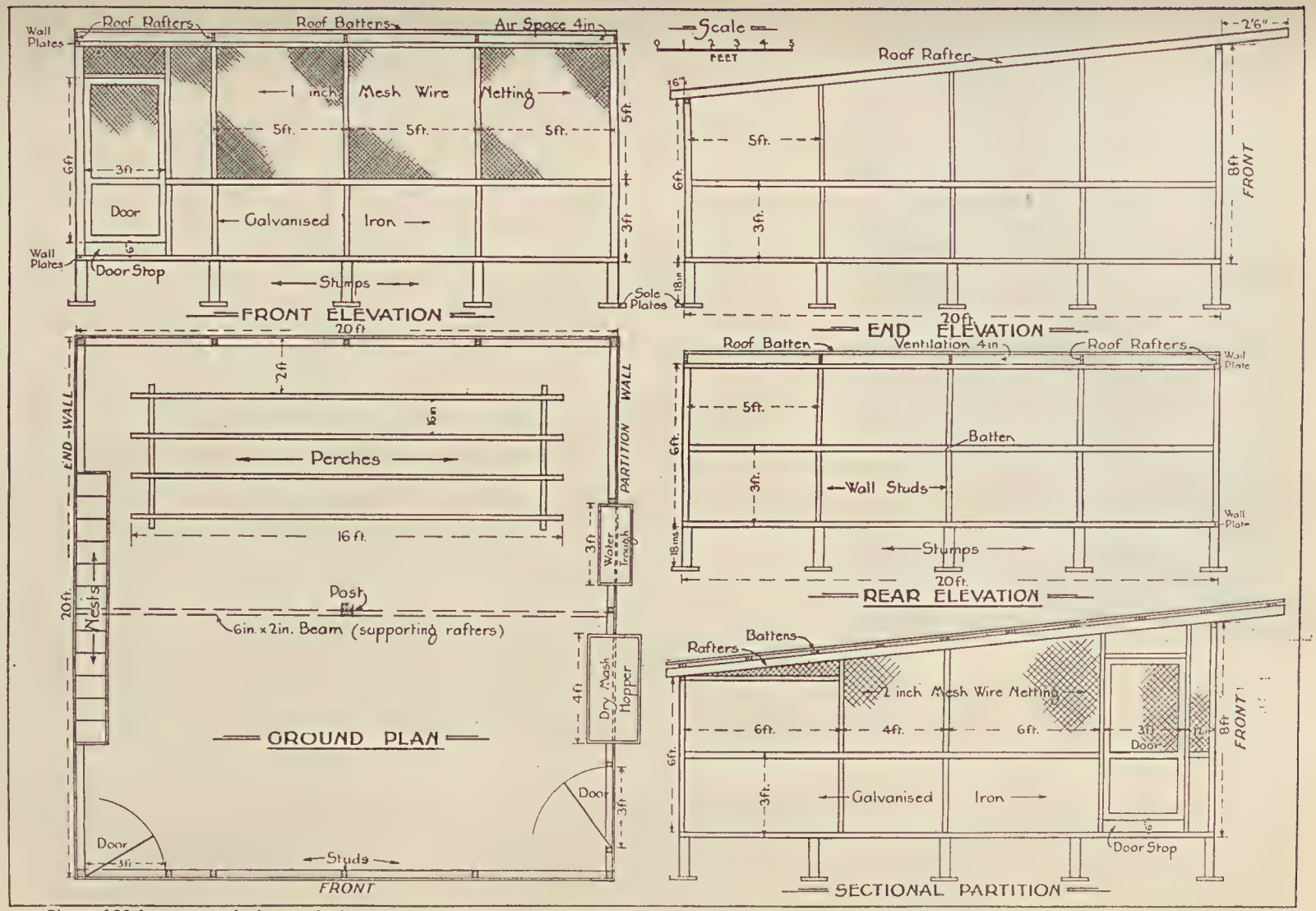
Material used in Buildings

Poultry houses can be built of different kinds of materials, the most favoured being galvanized iron, asbestos cement sheets, brick, or reinforced concrete. It is intended in this article to deal with galvanized iron and asbestos cement sheets only.

Separate plans are provided for each type of house, owing to the difference in construction of wood framing, &c. By following the plans shown in this article, no difficulty should be experienced in the building of laying houses of either material.



Plans of 20-ft. section of a laying shed constructed of asbestos cement sheeting. Sizes of timber are shown in the sectional elevation and ground plan.

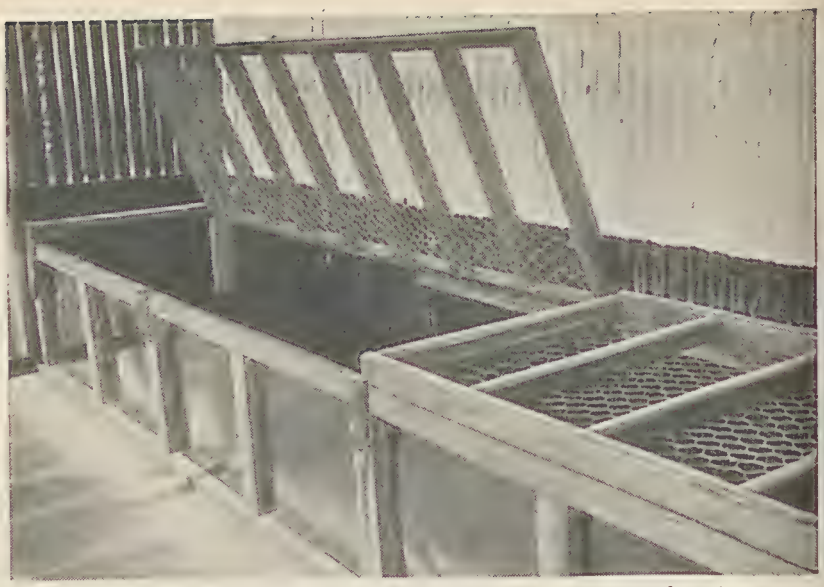


Plans of 20-ft. section of a laying shed constructed of corrugated galvanized iron. Sizes of timber are—Wallplates, 3 x 2-in. hardwood ; wallstuds, 3 x 2-in. hardwood; wall battens, 3 x 1½-in. hardwood ; roof battens, 3 x 1½-in. hardwood ; roof rafters, 4 x 2-in. hardwood ; stumps, 4 x 4-in. redgum; sole plates 12 x 6 x 1½-in. redgum ; perches 3 x 2-in. hardwood.

Perches

There are two different methods of perching used in laying houses. The usual type consists of a group of long perches, set well back in the pen and running parallel with the rear wall and approximately 2 feet from it.

It is necessary to provide 6 to 8 inches roosting space for each bird, and on this reckoning, four perches, each 16 feet long, made from 3 x 2-in. hardwood with the corners smoothed off, will provide comfortable roosting space for 100 hens.



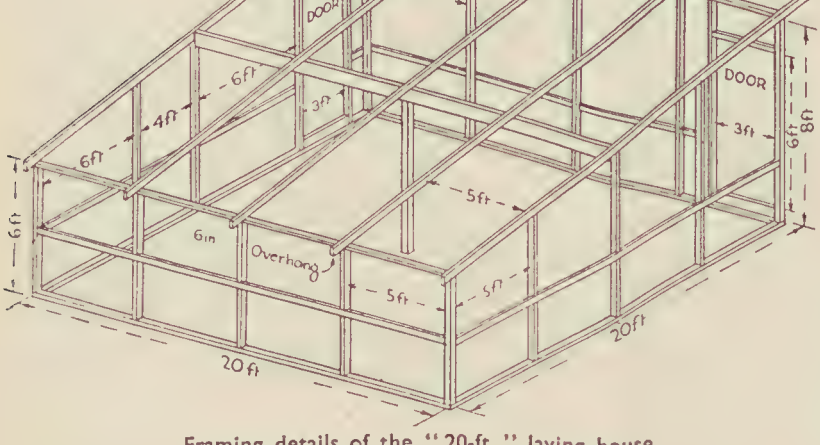
Perches arranged over manure pits. One section is open for cleaning.

The perches should be placed 16 inches apart and approximately 30 inches from the ground. They can be suspended from the roof rafters by stout iron rods, having a thread on either end. A hole is bored into the rafter, into which one end of the rod is inserted, and held in position with a nut which rests on the top surface of the rafter. The bottom cross rail which supports the perches is fastened in the same manner.

With the perches thus suspended, the house is easy to clean, as there is no obstruction for broom or scraper. The perches should be free of cracks to prevent red mite from living and breeding around the roosts. The red mite is one of the worst pests in poultry houses, and constant attention is required to keep it in check.

The perches should be all on one level, not one above the other. If perches are of varying heights, the birds will fight for the topmost position, causing unrest at roosting time.

The second method is to place short perches crosswise over a manure pit which is covered with wire-netting as illustrated above. It is estimated that 75 per cent. of a fowl's manure is voided while perching. If this amount can be received in the pit, the litter is cleaner, and the birds will have better sanitary conditions.



Framing details of the "20-ft." laying house.

Equipment

Nests.—Owing to the numerous designs of nests in use on poultry farms, it is not intended in this article to deal with any particular one.

For general purposes, however, nests should be placed 2 to 2 ft. 6 in. from the ground, the interior fairly dark; at least 10 inches of nesting width for each eight birds should be provided.

To supply equipment in excess of requirements only adds to the cost of the building.

Food Hoppers and Water Trough.—Four feet of dry mash hopper feeding space, and 3 feet

[*Continued on page* 118.

Winter Forage Crops in the Fire Areas

By W. B. MILLER, M.Agr.Sc., Senior Inspector of Agriculture

THE serious bush and grass fires which have swept extensive areas in the North-Eastern, Western, Central and Gippsland districts have caused not only great loss of life, but also of buildings, fencing, and fodder. Even before the fires the fodder reserves held in Victoria were much less than normal, and it is evident that a serious position will arise unless early autumn rains are received throughout the State.

It is estimated that the cereal hay cut in Victoria last harvest was less than half of the normal amount, and there was very little carried over from the previous season. Despite shortage of man power and other difficulties, strenuous efforts were made to cut the maximum quantity of pasture hay. Considerable quantities were conserved but it is unlikely that more than the average amount is now on hand.

As buyers have discovered, oats for feeding purposes are almost unobtainable, and it is unlikely that any feed barley will be available from the Barley Board. Fortunately, ample supplies of wheat grain may be obtained from the Australian Wheat Board at 3s. 6¾d. per bushel delivered in truck lots at any railway station in Victoria. Supplies of bran and pollard are increasing slightly, but the demand is so great that there is no likelihood of farmers obtaining their full orders at least until next spring. The position in the neighbouring States is somewhat better, but transport difficulties are great, apart from the fact that freight charges are considerable.

It is therefore obvious that all farmers who are in the position to do so should sow a maximum area of forage crops in order that feed for their stock may be available as soon as possible after the autumn rains arrive. This applies throughout the State.

To rely on pasture growth alone is to take a great risk that the season will be unusually favorable, and it is well known that the cereals—oats, barley, or wheat—will provide more green feed per acre than will the autumn growth of pastures. It is agreed that labour is involved in the planting of forage crops, and this appeal is addressed therefore only to those who have the labour and other facilities available.

On the dairy farms in particular it is usual to sow in the autumn some oats for winter fodder, and even on the sheep and station properties oats are usually grown. In the wheat belt oats are widely sown for sheep, and a maximum area should be seeded this season to assist the sheep to rear a maximum number of early fat lambs.

It is not possible to generalize as to the effect the fires have had on the productivity of the pastures for the coming season. In some cases, particularly those pastures comprised mainly of perennial grasses, little permanent damage may result, but in others grass and clover seed has been completely incinerated and the future pasture sward may be thin, even after good rains.

In selecting paddocks for sowing to winter forage crops, the expected pasture recovery will be assessed in relation to the other relevant factors such as fencing, accessibility for controlled grazing, and suitability of the soil.

Seed and Fertilizer

To give optimum returns, at least 60 lb. of seed per acre should be planted and up to 100 lb. may be used to advantage in the wetter districts. A special supplementary ration of superphosphate at the rate of ½ cwt. per acre will be made available for cereal forage or hay crops to be planted on farms burnt in the recent fires.

All applications must be made on a special form which will be available from the chairman of the War Agricultural Committee and certified to by the chairman on behalf of his committee. The applicant must name his usual supplier of superphosphate on the form, which should be forwarded, after certification, to the Fertilizer Section, Department of Agriculture, 81 Collins-street, Melbourne.

If the season proves very favorable or when the spring comes it may be possible to take the stock off the fodder crops and harvest them for hay or grain to increase the reserves for the following year.

Seed oats are scarce but supplies are available at present and farmers should lodge their orders immediately with their usual suppliers and take early delivery. Early-maturing varieties such as Mulga (very early), Dawn, Fulghum, and Belar provide more winter feed than do the standard varieties Algerian and Algeribee which, in southern Victoria, are better all-purpose types. It is probable, however, that only Algerian seed will be available from most merchants. Should the farmer's usual seed merchant be unable to meet the order the case should be referred to the Cereal Branch, Department of Agriculture, Melbourne, C.2, and the farmer will be put in touch with a supplier. Country merchants may obtain supplies in a similar manner, and are urged to have seed on hand for their clients.

Cape barley provides good early feed, but is not recommended where there is a probability that hay could be cut from the area at the end of the season. Barley is difficult to obtain, but some may be available later from the Australian Barley Board, 175 Collins-street, Melbourne.

Some farmers may desire to sow wheat with the object of providing green forage for sheep or cattle, and later stripping the crop for grain if it makes sufficient growth in the spring. In such cases, application for a licence must be made to the Wheat Stabilization Committee, T. and G. Building, Collins-street, Melbourne.

The sowing of cereal forage crops for autumn and winter feed is a normal practice on many farms, and dairy farmers in particular are urged to plant areas sufficient for their needs in order that the production of dairy produce of all types may be maintained or increased if possible. All the dairy produce that can be produced is required for the Services, civil population, and for export to the United Kingdom.

Red Cross Co-operates in Government Salvage Scheme

Under a national waste-paper collection scheme launched by the Salvage Commission, Red Cross operations in country districts are expected to be considerably extended.

All organizations such as Red Cross which have been collecting waste paper must now apply for Government licences to continue the work. In Victoria they will sell direct to the Commonwealth Government Agents, the Australian Paper Mills, Fairfield.

The Government's aim is not to interfere with the salvage activities of various voluntary organizations or to deprive them of profits. The sole aim is to increase collections by bringing all groups under a uniform system. The system will be worked on a municipal or shire basis. One salvage organization only will be licensed for each area. In places where several have been operating, they will be brought together on a single committee, and profits will be divided as agreed upon by executives of the participating organizations. The Committee will become official units of the National Salvage Corps.

Officers of Victorian Division of the Australian Red Cross Society, which is one of the principal voluntary organizations engaged in salvage, have already promised their support for the Government scheme, and will instruct members throughout the State to give it their utmost co-operation. They believe that revenue will be increased rather than diminished by the change-over. Extensive publicity by the Salvage Commission will emphasize the national importance of saving paper, and will open up reserves of waste hitherto untapped. It is hoped that the salvage of paper will be doubled by the new arrangement.

Salvage of all waste except paper will still be continued by individual organizations. Red Cross in the suburbs is concentrating upon the collection of bottles, metals, cloth clippings and other commodities, and Red Cross branches throughout the State will send consignments of these goods to the Victorian Division Waste Products Depot, 684 Elizabeth-street, Melbourne. In the city proper Red Cross will continue to collect paper as in the past, but under licence.

Newspapers, which are used mainly for wrappings, may also be collected by Red Cross branches and sold locally. [AUSTRALIAN RED CROSS SOCIETY.]

War Agricultural Committee Notes

Compiled by THE CENTRAL EXECUTIVE

DURING the month of January Victoria experienced grass fires more serious than any ever previously known. Thousands of acres of rich agricultural land were laid bare and large numbers of stock were destroyed.

The fires have dealt a serious blow to the food-producing capacity of this State at a time when every ounce of food is essential to further the nation's war effort. Every endeavour must be made to ensure that further losses in food production are avoided, and it is to this end that distribution of materials to burnt-out farms is being undertaken as quickly as possible.

The War Agricultural Committees, with their State-wide organization composed mainly of practical farmers, have undertaken the detailed work of distribution of materials under policy laid down by the State Bushfire Relief Committee. Local knowledge and local allocation ensure that the most deserving cases in any district will receive preference over others. The War Agricultural Committees are concerned only with the distribution of materials to farmers and are not directly connected with the provision of financial assistance, which is being granted by the Bushfire Relief Committee.

The quantity of fencing and building materials available is limited, and care must be taken to see that it is used to the best advantage. It is the responsibility of the Local Committee to see that material is released first to those farmers who have the labour to utilize it at once, and that it does not lie idle on farms. Fencing material will be made available under this scheme only for the replacement of damaged boundary fences. Similarly, galvanized corrugated iron will be supplied for roofing only where it will be used as a catchment for household drinking water.

The above-mentioned materials are being released by the Department of Munitions in bulk to each district, and the Local War Agricultural Committee is responsible for allocating its quota to the best advantage to applicants within the district.

Tentative quotas were originally fixed by the War Agricultural Committees' Central Executive from preliminary estimates of damage. The quotas are being adjusted as surveys of damage are made and individual orders are lodged. In this way, each district obtains a portion of each consignment of material arriving in Victoria according to the amount of damage to be repaired.

Individual applicants requiring fencing material should lodge their orders with the local hardware merchants, who will place them on the retailers' list so that the War Agricultural Committees may allocate the material through the normal trade channels. No further application need be made, as release is being made in bulk.

The following fencing material, limited quantities of which are now on hand in Victoria, has been made available specifically for bushfire relief, by arrangement with the Army, the Air Force, and the Munitions Department.

(*a*) Steel fencing posts—5 ft. 6 in. long.

(*b*) Tag pickets—steel posts as used by the Army. These are 5 ft. 6 in. long, pointed, and the same size and shape as Y steel posts, having a hole punched 1 in. from the top then 5 tags each 1 foot apart, the top one being 1 in. from the hole; 20,000 of these pickets are being punched with holes suitable for normal fencing requirements.

(*c*) 14-gauge black barbed wire—army stocks.

(*d*) 10-gauge black plain wire.

(*e*) 12½-gauge H.T. black plain wire.

(*f*) 10-gauge plain galvanized wire (stocks very limited indeed).

(*g*) Black ringlock pig fencing—to be released only for repairs to pig fences.

(*h*) wire netting—1½-in. mesh, black.

(*i*) Foot netting—galvanized 1½ in. x 12 in.

(*k*) Farm gates—assorted sizes.

Applicants requiring building materials, which are under the control of the Munitions Department, should lodge their orders with the

local hardware merchants and complete the usual application form (e.g., G.I. form for galvanized iron, P.I. form for piping, and A.C.I. form for asbestos cement sheeting). The material will be made available on the recommendation of the Local War Agricultural Committee from bulk stocks released to merchants specifically for bushfire relief purposes. The application forms will be forwarded to the Munitions Department for examination after the material has been supplied.

As the quantity of building materials available is insufficient to permit the erection of temporary structures, it is being wholly reserved for permanent new buildings. To house families temporarily, tents have been made available by the Commerce Department and these, together with accommodation provided in near-by areas, have sufficed to provide at least a roof over the heads of the homeless.

A considerable quantity of materials has already been sent to country centres for distribution to farmers whose properties have been damaged. At the beginning of February, the War Agricultural Committees had been instrumental in distributing throughout the devastated areas over 160 tents, together with the necessary floorboards and hurricane lamps; over 80 tons of asbestos cement sheeting; a considerable quantity of tools, such as hammers, axes, &c.; 38,000 tag pickets (not bored); 40,000 tag pickets (bored); 17,000 steel posts; 97 tons of black barbed wire; over 100 tons of plain galvanized wire, and a quantity of wire netting.

The Forests Commission, with the aid of men from the Civil Construction Corps, has provided a stock of wooden stays and strainers for distribution on the recommendation of the Local Committees. These posts will be a considerable help in the construction of permanent boundary fences. Concrete fencing posts are also available for this purpose, but the cost of transport in this case must not be overlooked. For these two types of posts, farmers should make their own purchasing arrangements with the Forests Commission and concrete manufacturers respectively, as there is no control operating on these items.

To enable the Committees to carry out effectively their portion of this task, they must have the co-operation of every farmer and business-man in their district. Assistance can be rendered by the early lodgment of orders by farmers and by adherence to the simple instructions mentioned above.

Join or Form a War Savings Certificate Group

POULTRY LAYING HOUSES—*continued from page 114.*

of watering space should be provided for each 100 fowls. For wet mash, 16 feet of feeding space is sufficient for 100 fowls.

All equipment should be so designed that it may be readily removed from the house to facilitate cleaning.

Construction

By following the plans shown in this article no difficulty should be experienced in building the laying house. The plans give all the details of construction, size and placement of materials. All materials are stock size, and may be obtained at most timber yards.

THE ARGENTINE ANT

By T. W. HOGAN, B.Agr.Sc., Assistant Entomologist, Biological Branch

THE Argentine Ant (*Iridomyrmex humilis* Mayr.) was recorded in Melbourne in 1939 by Mr. J. Clark, of the National Museum. A subsequent survey showed it to be well established in several suburbs of Melbourne, but there has been no indication that it is present in other parts of Victoria.

The "Standard Government Formula Argentine Ant Bait," developed in the United States of America, has since been tested out on infested properties and found to be highly effective. If the instructions given hereunder are followed, the ants can be prevented from entering the house and their numbers greatly reduced, even in one season.

How to Recognize the Argentine Ant.

The Argentine ant can be distinguished by the following characteristics:—The worker ant (fig. 1) is about one-tenth to one-eighth of an inch long, slender, and dark-brown in colour. The worker ant possesses a single joint (or petiole) between the thorax and abdomen. When several of these workers are crushed between the fingers no noticeable odour is given off, whereas native ants of the same genus give off a somewhat sweetish, pungent odour.

When seeking food the ant moves in trails, and its unequalled persistence in entering the house usually indicates to the householder that it is not one of the native species. Where it is properly established, no other species of ant will be found in the same area.

Habits and Economic Importance.

Although considered a serious agricultural pest in the United States owing to its habit of protecting and spreading other pests, its purely urban occurrence in Victoria makes it important mainly as a household pest. In this regard, its importance lies in its enormous numbers and its persistence. It causes constant annoyance by its presence in the house, getting into clothing, beds, cupboards, bathrooms, and forming long trails through the house in order to reach food. However, it does not bore into sound wood or the foundations of houses, in spite of a common belief to the contrary.

The Argentine ant—worker.

[Magnified 16·5 times]

In Melbourne, the spread of the ant by natural means, i.e. by direct expansion of existing areas, has been slow as compared with its rate of spread in the United States, and in the past it seems to have entered new areas mainly through human agency, such as by accidental carriage in potted plants.

Control

Tests by the Victorian Department of Agriculture have demonstrated that correct use of the "Standard Government Formula Argentine Ant Bait" provides a simple and effective method of controlling the Argentine Ant. The measure of control obtained will depend upon the care of the householder in applying it and in the continuity of its use.

Preparation of the Bait.

In the United States of America where considerable research has been carried out on this pest, a poison syrup bait known as the "Standard Government Formula Argentine

Ant Poison" has been perfected. This is prepared as follows:—

Sugar (granulated) ..	1 lb.
Tartaric acid (crystallized	10·3 grains
Benzoate of soda ..	14·6 grains
Water	$\frac{5}{6}$ pint
Sodium arsenite (chemically pure)	26 grains
Honey	$2\frac{1}{3}$ oz.

Specific directions for preparing this syrup are as follow:—Warm five-sixths of a pint of water in a clean vessel over a low fire. When it is tepid, add the tartaric acid, the benzoate of soda, and then the sugar slowly, and stir constantly to prevent burning. Measure the depth of the liquid in the vessel with a stick. Slowly bring the mixture to the boil and allow it to simmer for 30 to 40 minutes. Remove from the stove and add water to the original depth on the measuring stick to make up for evaporation. Stir in the $2\frac{1}{3}$ oz. of honey before the mixture cools; then add the 26 grains of sodium arsenite which has been dissolved in 1·8 fluid ounces of hot water and partially cooled before pouring into the syrup.

By Government regulation all commercial manufacturers of this bait must be registered and the bait must comply with the following standard:—

Sodium arsenite ..	0·12–0·20 per cent.
Acidity (as tartaric acid) ..	0·00–0·10 per cent.
Solids	50·0°–56° Brix.

Containers for the Bait.

Any type of watertight container will serve the purpose as a container for bait, but it must be clean and should be provided with a lid. Tins or waxed paper cups are the most satisfactory. Provision for the entry of the ants is made by punching holes in the side or by indenting the top. The success of the treatment depends on the worker ants taking back the poison bait to the queen ant. For this reason, wood-wool, straw, or even twigs, should be placed at the bottom of the containers to prevent the ants drowning in the syrup.

Quantity of Bait to Use.

Not less than 1 pint of bait should be used for each treatment, and for heavily-infested properties up to 4 pints should be used. In a tin with a capacity of 6 fluid oz. ($3\frac{1}{2}$ in. x $2\frac{1}{2}$ in.) place 1 to $1\frac{1}{2}$ fluid oz. of bait, i.e., a pint of bait should be divided between 15 and 20 containers. The greater the number of baits used the more rapid will be the reduction in the ant population, but for any degree of control at least one pint should be used each treatment.

Setting Out the Baits.

Place the baits at a distance of about 10 feet all round the *outside* of the house, with a few extra outside the kitchen. This will prevent entry of the ants into the house, but to give control over the whole property, the baits should be placed along the inside of the fences and wherever the ants are seen. Choose sheltered positions wherever possible in order to retard the drying of the syrup. It is important to remember that these baits are effective for only six to eight weeks in warm weather, and should be renewed after this period. The old syrup should be thoroughly cleaned out before fresh syrup is put in.

Sometimes the ants may be found nesting under particular tins, and in such a case, the tin should be moved elsewhere and the nest treated with kerosene, creosote, or carbon bisulphide.

Other Methods of Control.

Occasionally, it may be desired to use supplementary measures to reduce the ant population more rapidly. In such a case, the nests can be destroyed by injecting carbon bisulphide, or any other soil insecticide, into the nests; or by pouring kerosene or creosote over the nests. If there are indications that the ants are nesting in fissures inside the house, spraying with ordinary fly spray will often force them to leave. The spray will also kill any ants which enter the house.

Prevent the Spread of the Ants.

The principal means by which the pest is spread is by the transfer of plants. Householders are asked to co-operate by seeing that no infested material of any sort is shifted into uninfested areas.

Warning.

The bait is poisonous to human beings, and where young children are present the baits should be placed in inaccessible positions. By puncturing the sides of a tin, it can be nailed on to wood so that children cannot remove it.

Live Stock Notes

Compiled by
A. C. T. HEWITT, M.Agr.Sc.,
Live Stock Science Officer

As half of the beef produced in Victoria comes from dairy cattle, trends in the dairying industry are reflected in the production of beef. At the present time dairy cattle are being slaughtered in large numbers, and the production of beef is temporarily high. Farmers are urged to hold as many dairy and breeding cows and rear as many heifer calves as possible to safeguard the interests of both the dairying and beef industries.

The sheep industry is increasing principally at the expense of wheat and dairying, but the industry received a severe setback as the result of drought conditions in the Mallee and Northern districts where large numbers of fat lambs are normally produced. It will be noted that lamb slaughterings are 850,000 below those of the previous year.

The dry summer and the serious bush fires recently experienced will be reflected in lower production of mutton, lamb, and perhaps wool during 1944-45.

Feeding Pigs Without Milk

In the absence of separated milk, pigs should receive ¼ lb. of meat-meal per head daily, irrespective of their size, from weaner to baconer weight. The same quantity, ¼-lb., should also be given to dry sows, and 1 lb. daily to sows with litters. These quantities will balance all the cereal grain or meal that the pigs can eat, and will be approximately 1 lb. daily for every 25 lb. live weight of growing and fattening pigs, or, once the pigs are receiving all they can eat, their daily grain allowance should be increased by ¼ lb. per pig every week.

The above quantities are a general guide but actual requirements will vary with the individual, which means that the feeder must use his discretion.

Breeding sows should be given enough grain to keep them in right condition.

In addition to the grain and meat-meal, the pigs should get one of the following:—green pasture, hand-fed greenstuff, lucerne chaff or hay, or meadow chaff or hay, or cereal chaff. These foods are listed in their order of preference.

A further supplement of 4 parts of ground limestone (carbonate of lime) and 1 part salt should be given to the above diet either as a self-fed lick or mixed in the cereal foods at the rate of 1 oz. daily for each growing pig and dry sow, and 2 oz. daily for each sow suckling a litter.

Half-a-gallon of separated milk will replace a ¼ lb. of meat-meal in the diet described above, and, as meat-meal is in limited supply, meat-meal should be used carefully, and then only when there is less than half-a-gallon of separated milk available daily for each pig.

[L. A. Downey, H.D.A., Pig Expert.]

Poultry

The housing of large numbers of birds together on commercial poultry farms to obtain maximum egg production often leads to the occurrence of a number of vices such as feather pulling, picking, or eating, egg-eating, tail-picking, and vent-picking, which occur with birds of various ages, and toe-picking which occurs with young chickens.

These vices may spread extensively amongst the birds, causing great loss, and are difficult to eliminate. Great care in the selection and mating of the breeding stock is necessary, if the resulting progeny are to possess a high degree of constitutional vigour and strong character, in order that they will not be molested by other birds, for it is usually the weak birds which are attacked. Only birds which have not been attacked or injured by others, and which are free from pugnacious habits, should be used for breeding.

The environment usually provided on poultry farms naturally plays a large part in the encouragement of vices and, for this reason, when the trouble has reached extensive proportions, the best advice that can be offered is to provide a great deal more room for the birds, giving them access to free range, and dividing them into smaller lots.

Clean conditions, proper temperature and ventilation, avoidance of over-crowding, freedom from parasites and disease, especially the red mite which lives and multiplies in the perches, and which is one of the most persistent pests that the poultry farmer has to deal with, are important considerations, if the birds are to remain free from irritation.

Sufficient nests should be provided, and made as comfortable and seclusive as possible. Every encouragement should be given to the birds to lay in the nests, and not on the floor, where other birds have an opportunity for vent-picking or egg-eating. It should also be pointed out that prolapse or protrusion of the vent and other internal organs, which is the result of a physiological weakness of the bird, may lead to vent-picking. Nests and alighting boards should be placed in such a position that other birds cannot pick those laying in the nest.

There should be sufficient perch room, and ample scratching litter should always be provided to keep the birds occupied.

Some vices are due to a deficiency in the diet, and it is important that the ration should contain a variety of foods, to fully satisfy the birds. All rations should be nutritious and include sufficient, but not excessive, amounts of protein concentrates such as meat-meal, ample fresh and tender chaffed green food, and any other available fresh and suitable food.

A continuous supply of cool, clean, drinking water and shell-grit must always be available for the birds. The ingredients of the ration, and the system of feeding, may, with advantage, be changed occasionally, and this should be done gradually. There should be ample feeding space provided, so that each bird may obtain the required amount of food in comfort.

Vices may commence with one or two birds in a pen and, if not checked at once, may spread quickly through the flock. Therefore, it is advisable to make regular inspections of the pens and immediately isolate injured birds, and, if they can be detected, those responsible for the trouble. An application of Stockholm tar of good quality or other suitable preparation, may be applied to the injured parts.

With good management, it should be possible to reduce the occurrence of vices to a minimum.

[H. F. Clinton, Poultry Expert.]

Bees

Losses of bees during a heat wave can be considerably reduced if certain precautions are taken, such as the provision of shade and an ample and easily accessible supply of water. Conditions within the hive can be improved by the use of the migratory cover, made from 1-in. timber, and carrying the air space and bee-way mat above the frames; whereas the Behune telescopic cover with the close fitting mat is most unsuitable for districts subject to heat waves.

During hot weather, the hives should have full-width entrances to give the bees ample fanning space, and the entrances should face the south-east, so that the forced out cluster and the fanners at the entrance to the hive are shaded from the sun.

Apart from lifting the hive from the bottom board to permit greater ventilation, hives should not be manipulated during heat waves, as interference often breaks the stream of cool air put up by the fanners. It is an advantage to have moveable bottom boards in heat-wave localities, as these permit the elevating of the hives to afford greater ventilation.

Where provision is made for the comfort of bees during heat waves, honey yields are increased, as otherwise, much of the colony energy is dissipated in the endeavour to control the hive temperature.

In many of the hot northern districts, open shade sheds can be constructed cheaply from brush—Mallee scrub and ti-tree. These sheds should be wide enough for two rows of bees with a working alley-way down the centre and with the opening to the south to permit the greatest shelter from the sun.

During heat waves, losses of bees may occur within the hive when the bees will be found dead in a tightly packed wedge-shaped mass under the cover and between the frames or from clustering on the outside of the hive without finding relief from the direct rays of the sun.

[W. A. Collins, Apiary Inspector.]

Pendulous Crop in Turkeys

By W. D. SHEW, G.M.V.C., B.V.Sc., Senior Veterinary Officer

PENDULOUS crop in turkeys is very prevalent in certain inland districts of Victoria, particularly in warm weather, and sometimes results in severe economic loss, not only from mortality but also from poor development and emaciation in those birds which do not die. The condition is referred to under a variety of names, such as water bag, sour crop, and hanging crop.

The condition may be brought about by two main factors: Firstly, heredity, as certain families are very prone to develop the trouble, and such turkeys should on no account be bred from. Secondly, climatic conditions definitely influence the prevalence of the trouble, especially if resistance is low, as in certain flocks.

In hot, dry weather, if water is not easily accessible, and as turkeys resent a long walk to a watering place, they put off going for a drink until they are very thirsty. Then they gorge themselves, and cases of pendulous crop are likely to occur.

No medicinal treatment is of any avail.

Provide a plentiful supply of clean, fresh water in a shady spot close to where the turkeys usually rest on hot days, so that by drinking little and often they will be less likely to contract the trouble. When a flock shows evidence of pendulous crop, affected birds or their relatives should not be used as breeders owing to a strong hereditary tendency to develop the trouble.

An eight-months-old turkey hen with a pendulous crop of about five months duration.

[After *Hinshaw and Asmundson.*]

Turkeys usually first show the enlarged crop when two to three months old, but cases do occur in older birds. Some crops become so distended that they reach the size of a football and nearly touch the ground. In advanced cases, the crop becomes injured by rubbing on stones, sticks, &c.; the wound often becomes septic, and death may ensue from blood poisoning.

COOL STORAGE OF APPLES

Gas Storage and Skin Coating Experiments

By G. B. TINDALE, B.Agr.Sc., Cool Storage Research Officer

Before the war, many stores were erected in England for the refrigerated gas storage of apples. So far, this new method of apple storage has not been adopted commercially in this country, although pears are now gas-stored at Shepparton.

The apple varieties grown in England are different from those grown here, and before gas storage of apples could be adopted commercially in Victoria, the requirements for each variety had to be determined by experiment.

In the following article, experiments involving some 250 cases are described, showing that the cool storage life of certain varieties may be extended 50 per cent. by the use of gas storage. In other varieties, the beneficial results of gas storage were obscured by the onset of disorders, and until these disorders can be completely overcome, it would not be advisable to attempt the gas storage of such varieties.

Results similar to those obtained with gas storage were obtained by the application of certain skin coatings prior to cool storage, but in these experiments the increase in storage life was not so great—approximately 25 per cent.

IN Victoria, cool storage is an essential part of the apple-growing industry. Practically every apple-growing district is equipped with a cool store, and the use of such stores for the storing of apples promptly after picking enables growers to supply the market with apples for almost the whole year.

While the advantages of cool storage to both grower and consumer are obvious to most people, the many difficulties met with in storing living products like apples are not always appreciated. In cool storage apples are subject to disorders, none of which occur at atmospheric temperatures, while the varieties differ greatly in their susceptibility to disorders. As there is but one crop of apples each year, the experimental study of these disorders is a slow procedure. However, it is now possible to overcome most of the disorders to which Victorian grown apples are subject in cool storage by the use of certain storage temperatures for some varieties, and different storage temperatures for other varieties.

However, the successful storage of apples means much more than merely keeping them free from disorders. The apples, when removed from storage, should be crisp and juicy, and of

casonably good flavour. The storage life of each variety is limited, and when stored beyond these limits, the apples become mealy and either devoid of flavour or develop an objectionable flavour. Towards the end of each year, large quantities of overstored apples are placed on the market, and the consumers roundly condemn "those cool-stored apples". Actually, it is not cool storage which is at fault, but the incorrect use of cool storage. Unfortunately, the dessert apples such as Jonathan and Delicious, which are in greatest demand, have the shortest cool-storage life. The normal storage life of these varieties is ended after September, when the quality becomes poorer and poorer. Nevertheless, in the absence of anything better offering, sales continue until the soft fruits become available at the end of the year, followed shortly afterwards by new season's apples.

For some years, experiments have been proceeding at the Experimental Chambers, Government Cool Stores, Melbourne, with the object, not only of studying the disorders to which Victorian grown apples are subject in cool storage, but also investigating methods whereby the storage life of apples might be increased. Should it be possible to increase storage life by say, 50 per cent., then it would be possible to supply the market with dessert apples possessed of good quality the whole year through, and thus, during the latter months of the year, obviate the objectionable practice of selling overstored apples to the public.

In the 1943 season, two methods for increasing cool storage life were investigated, (*a*) Gas storage, (*b*) Application of various skin coatings. These methods for increasing storage life had been tried on a smaller scale in previous years, but the results were most confusing owing to the onset of various disorders. Gradually, however, methods for overcoming most of the disorders were evolved, and, as will be shown below, when a storage technique for overcoming disorders is adopted, both gas storage and application of skin coatings are highly effective in increasing storage life.

Gas Storage

The term, "gas storage" has the virtue of being short, and fairly accurately describes the process—the apples being stored in an atmosphere containing a certain percentage of carbon dioxide (CO_2) gas. Perhaps "storage under restricted ventilation" would describe the process more accurately. In gas storage, the apples are "shut up" in a gas-tight chamber. When first closed, the atmosphere of the chamber is that of ordinary air and contains 21 per cent. oxygen and practically no carbon dioxide. The apples, however, are living, and in the life processes, absorb oxygen and give off carbon dioxide in equal volume. Hence the oxygen content of the chamber gradually falls, while the carbon dioxide content rises. With restricted oxygen supply, the respiratory processes are slowed down, and the storage life is increased. By the time the oxygen content has fallen to 16 per cent., the carbon dioxide content has risen to 5 per cent. It has been found that when the carbon dioxide content rises to 7 to 10 per cent., a storage disorder known as Brown Heart develops, the susceptibility varying according to variety and maturity. Hence, it is undesirable to allow the carbon dioxide content to increase much beyond 5 per cent. The "gas" is easily held at that level merely by manipulating small ventilators, which allow of an exchange of outside CO_2-free air with chamber air containing an excess of CO_2.

Gas storage was first developed at the Low Temperature Research Station, Cambridge, England, and since then many gas stores have operated in England. None of the varieties gas-stored in England is grown commercially in Victoria, and hence the conditions required for successful gas storage of local varieties had to be determined locally. Incidentally, gas storage does not displace cool storage, for the same low temperatures are required for gas storage as for air cool storage.

Skin Coatings

Of late years, it has been found that the application of certain skin coatings to apples before storage considerably increases storage life. It is considered that the effect is somewhat similar to gas storage in that by partly blocking the lenticles the supply of oxygen to the tissues of the apples is impeded. In the 1943 experiments, three different types of skin coatings were tried out:—

(*a*) A 10 per cent. alcoholic solution of castor oil and shellac. This skin coating was developed by the Council for Scientific and Industrial Research, Food Preservation Research Laboratory, Homebush, New South Wales.

(*b*) An oil emulsion known as Vac-Guard, developed by Mr. F. A. Seed and his co-workers in the laboratories of the Vacuum Oil Co., Melbourne.

(*c*) An emulsion known as Spartan Fruit Emulsion, marketed by the Hardie Trading Co., Melbourne.

In the 1943 experiments, six of the main varieties grown in Victoria were obtained from a grower at Red Hill at three stages of maturity a fortnight apart during the months of March and April, and then promptly stored at the Experimental Chambers, Government Cool Stores, Melbourne. Each lot of each variety received the following treatments :—

(*a*) *Gas stored in 5 per cent.* CO_2 (the storage temperatures varied according to variety). All the gas stored apples were wrapped in oil wraps.

(*b*) *Air stored controls.* Also wrapped in oil wraps and stored at the same temperatures as the gas stored lots.

(*c*) *Treated with the above skin coatings.* Also stored at the same temperatures as the gas stored lots.

(*d*) *Controls air stored without wraps and no skin coatings.* Also stored at the same temperatures as the gas-stored lots.

Results

Since the varieties differed enormously in their behaviour under the various treatments (mainly in their susceptibility to disorders), it is necessary to discuss the results with each variety separately.

Jonathan

The excellent and widely-grown Jonathan variety is extremely susceptible to disorders as well as having a relatively short storage life. Storage conditions therefore had to be designed with the object of overcoming disorders such as Soft Scald, Breakdown, and Jonathan Spot, and to a lesser extent, Superficial Scald. Experiments over several years showed that, while Soft Scald and Breakdown could be avoided by storing at 40° F., the storage life at that temperature was too short as a commercial proposition, and moreover the variety was extremely susceptible to Jonathan Spot when stored at that relatively high temperature.

It was later found that the critical time for Soft Scald and Breakdown development was during the early stages of storage, and that after a couple of months' storage, the temperature could be reduced without risk of disorders developing, the reduction in temperature permitting of a longer storage life. Ultimately, it was recommended to store Jonathans at 36° until the end of April, at 34° during May, and at 32° thereafter, which technique is now widely adopted in Victoria for storing Jonathans.

Under the abovementioned technique, Scald and Breakdown are almost completely overcome, while, by lowering the temperature fairly early, a reasonably long storage life is obtained without undue development of Jonathan Spot. Hence all the Jonathans, whether gas-stored, treated with skin coatings, or air-stored controls, were stored at 36° until the end of April, at 34° during May and at 32° thereafter.

The gas-stored Jonathans were "opened up" in mid-December, and after a further fortnight in air at 32°, they were removed to atmospheric temperature for examination. The condition of the apples was most outstanding. In appearance they were like freshly-picked apples. There were no disorders. The oil wraps had overcome Superficial Scald, which had developed in gas-stored Jonathans in previous experiments. (The variety is not normally subject to Superficial Scald in air storage.) Internally the apples were crisp, juicy, and of quite good Jonathan flavour. The air-stored controls were, by comparison, in poor condition. They were dull in appearance and were almost mealy and the flavour was either poor or objectionable, while a large proportion of the apples was most unattractive, due to severe Jonathan Spot development. As the result of examinations made earlier in the year, it was considered the storage life of the air-stored Jonathan controls was six months, whereas the storage life of the gas-stored Jonathans was nine months or an increase of 50 per cent.

Results with the various skin coatings applied to the Jonathans were also very satisfactory, the skin-coated apples showing to great advantage compared with the air-stored controls after September. Appearance, flavour, and crispness were all preserved much longer than in the controls, but not quite so long as in the gas-stored lots. The cool storage life of the Jonathans treated with the various skin coatings could be stated as 7 to 8 months or, say, an increase of 25 per cent. over the storage life in air. Both the castor-oil shellac, and the Vac-Guard skin coatings had the highly desirable effect of almost completely overcoming the storage disorder—Jonathan Spot, and in that regard were almost as effective as gas storage. So far as increasing storage life was concerned, all three skin coating treatments were equally effective.

In addition to the gas storage and skin coating experiments with Jonathans, a small "temperature of storage" experiment was conducted with the object of confirming results which had been obtained in previous years. Jonathans of two maturities (2nd and 3rd picks) were stored under three temperature conditions :—

(*a*) at 32° continuously ;

(*b*) at 36° until the end of April ; at 34° during May, and at 32° thereafter ;

(*c*) at 40° until the end of April ; at 36° during May, and at 32° thereafter.

The results confirmed those obtained in previous years. Soft scald occurred only in those Jonathans stored continuously at 32° and then only in the second pick (2 per cent.).

Breakdown was worst in those stored continuously at 32° (2nd pick 7 per cent., 3rd pick 11 per cent.), intermediate in those stored at 36° to 34° to 32° (2nd pick 2 per cent., 3rd pick 5 per cent.), and least in those stored at 40° to 36° to 32° (2nd pick nil, 3rd pick 3 per cent.).

Results with Jonathan Spot ran in the opposite direction. Late in the year, nearly all the Jonathans stored at 40° to 36° to 32° had developed Jonathan Spot, while very little had developed in those stored at 32°. Now that Jonathan Spot may be controlled by skin coatings or gas storage, the 40° to 36° to 32° technique of storage temperatures for Jonathans may be more suitable than the 36° to 34° to 32° technique, especially for the larger Jonathans, which are so susceptible to Breakdown.

Delicious

The excellent dessert variety, Delicious, is somewhat similar to the Jonathan in that it is very subject to storage disorders, especially Superficial Scald and Breakdown, and also has a relatively short storage life.

Because of its susceptibility to Breakdown, this variety was stored under all treatments at the temperatures adopted for the Jonathans, i.e., at 36° until the end of April, at 34° during May, and at 32° thereafter. Notwithstanding this technique of storage temperatures, and the fact that the gas-stored lot and their air-stored controls were wrapped in oil wraps, the storage results with Delicious were not satisfactory owing to the high incidence of both Breakdown and Superficial Scald under practically all treatments, when examined at the end of December. It should be mentioned, however, that owing to the very light crop (two pickings only), the Delicious were all over-sized, mostly $2\frac{3}{4}$ to 3 inch., and it is well known that such large apples are particularly susceptible to Breakdown. Probably with normal-sized Delicious, there would not have been serious trouble with Breakdown.

Apart from those affected with Breakdown, the Delicious, from gas storage, were in particularly fine condition at the end of December. They were in appearance almost equal to freshly-picked apples. They were firm, crisp, and juicy and of quite good Delicious flavour. They were far superior to the sound air-stored controls, which had lost their flavour by the end of the year, and were more or less mealy.

The sound Delicious treated with the various skin coatings, were at the end of the year in a condition intermediate between that of the gas-stored lots and the air-stored controls.

Reverting to the disorders which developed in the Delicious, the first pick in gas storage developed 29 per cent., Breakdown, and the second pick 56 per cent. The percentage incidence of Breakdown was very similar for these two picks in the air-stored controls and also in each of the three skin treatments. Concerning Superficial Scald, the oil wraps controlled that disorder in the second pick, both in gas storage and in the air-stored controls, but did not control the disorder in the first pick. Incidentally, the second pick was much more highly blushed red than the first pick. The skin coatings did not control Superficial Scald. Obviously more research work is required on the storage disorders, Breakdown and Superficial Scald in the Delicious variety before gas storage or skin coatings with this variety could be recommended.

In addition to the experiments with the Delicious variety, a "temperature of storage" experiment was conducted with the first and second picks. This experiment was conducted with the object of confirming results of previous years where Breakdown was overcome by storing initially at 40°. The two picks were stored at the following temperatures:—

(*a*) At 32° continuously;

(*b*) At 36° until the end of April, at 34° during May and at 32° thereafter;

(*c*) At 40° until the end of April, at 36° during May and at 32° thereafter.

The development of Breakdown by the end of the year under the various temperature treatments, was as follows:—Stored at 32°, 1st pick 49 per cent., 2nd pick 66 per cent. Stored at 36° to 34° to 32°, 1st pick 15 per cent., 2nd pick 56 per cent. Stored at 40° to 36° to 32°, 1st pick 13 per cent., 2nd pick 26 per cent.

The trend of the above results is similar to those obtained in the similar experiment carried out with Jonathans. With the Delicious, the percentage of Breakdown was much higher throughout. This may be accounted for, perhaps, by the fact that the Delicious were all oversized ($2\frac{3}{4}$ to 3 in.), whereas the Jonathans were of average size ($2\frac{5}{8}$ in.).

It would seem, however, that with normal-sized Delicious the 40° to 36° to 32° technique of storage temperatures would probably overcome Breakdown, in which case, gas storage and the application of skin coatings to Delicious stored at these temperatures would probably be as effective as with other varieties.

Rome Beauty, Granny Smith, Democrat.

Rome Beauty, Granny Smith, and Democrat varieties may be discussed together. They are not subject to low temperature disorders and were therefore all stored at 32° continuously, and all gave highly satisfactory results when gas-stored, and almost as good results when treated with the various skin coatings. When removed from gas storage (all oil wrapped) at the end of the year, all were, in appearance, just like freshly-picked apples. Internally they were crisp, juicy, and of quite good flavour. There were no losses due to disorders, while losses due to mould attack were negligible.

The air-stored controls of these three varieties at the end of the year were in quite fair condition (these being particularly good keeping varieties). Nevertheless their condition was much inferior to that of the gas-stored lots. They had lost their bright appearance, they were not nearly so crisp and juicy, while they were possessed of little flavour. As with the Jonathan variety, it is considered that the storage life of these varieties in gas storage was increased by 50 per cent. compared with the air-stored controls, while the storage life of those treated with the various skin coatings was increased by about 25 per cent.

The Democrat variety is a dark red, late apple, renowned for its keeping qualities. Although of excellent appearance it is, however, sadly lacking in dessert quality. It is hard, lacks juice, and generally is regarded poorly. After nine months in gas storage, however, it was surprising to find that the quality had considerably improved. It was then firm but very juicy, of quite good flavour, and much superior to any dessert apple ex ordinary cool storage available at that time.

The Granny Smith ex gas storage was particularly good, being crisp and juicy, and the flavour exceptionally well preserved. In this locally-raised apple we are possessed of an outstanding variety, highly suitable for gas storage. If so stored, it could meet the November–December demand for quality apples. At present, the market is bare of quality apples at that time of the year.

The flavour of the Rome Beauty ex gas storage was quite well preserved, but this dual-purpose, attractive looking variety is not renowned for its flavour, and where gas-storage accommodation is limited, preference should be given to the Granny Smith and Democrat varieties.

Superficial Scald development in Granny Smith apples in cool storage nearly always occurs unless each apple is wrapped in an oil wrap. By the end of the year, it was observed that the wraps were no longer effective in the first pick, slight scald making its appearance. Further scald developed quickly when the apples were removed to atmospheric temperatures. One of the objects of the skin coatings was to determine if the coatings (on account of their oil content) would control Superficial Scald and hence dispense with the use of the relatively expensive oil wrap. All three skin coatings controlled Superficial Scald in the Granny Smith variety until the end of November, when slight scald made its appearance. It would seem then, that skin coatings are as effective as oil wraps in overcoming Superficial Scald.

Apart from disorders developing during storage, there is always a certain wastage due to mould attack. It was observed that the Vac-Guard skin coating, in which a fungicide is incorporated, was highly effective in reducing losses by mould attack.

Stewart's Seedling.

In previous trials, the gas storage of Stewart's Seedlings at 32° had been quite successful. In the 1943 experiments, however, there was a high incidence of Breakdown. Owing to the light crop, however, the Stewart's were all very large, mostly 3 in. and over, and it is considered that, with apples of normal size, there would not have been much trouble from Breakdown.

Removed from gas storage at the end of the year (all oil wrapped and stored at 32°), the first pick had developed 3 per cent., the second pick 19 per cent., and the third pick 39 per cent. Breakdown. Apart from the Breakdown, the first pick was in excellent condition and in every way superior to the air-stored controls. The second and third picks, however, showed slight core-flush, which rapidly spread when the apples were removed to atmospheric temperatures.

While the incidence of Breakdown in the second and third picks of the air-stored controls and the skin-coated lots was of much the same order as that occurring in the gas-stored lots, the incidence in the first pick was much greater. The general condition of the skin-coated Stewart's was again intermediate between that of the gas-stored lots

and the air-stored controls. However, until more knowledge is available concerning the control of Breakdown in this variety, gas storage or application of skin coatings can scarcely be recommended.

Summary

Victorian grown Jonathan, Delicious, Rome Beauty, Stewart's Seedling, Democrat, and Granny Smith apples were picked at three stages of maturity during March and April, and then promptly held in refrigerated gas storage (5 per cent. CO_2) until late December. All the gas-stored lots were wrapped in oil wraps as a preventive for Superficial Scald, as were the controls held at the same temperatures in ordinary cool storage. In addition, samples of all varieties were given various skin-coating treatments prior to holding in ordinary cool storage, at the same temperatures as the above. Neither those receiving the skin-coating treatments, nor their non-treated controls, were wrapped in oil wraps.

The Jonathan and Delicious under all treatments were held at 36° until the end of April, then at 34° until the end of May, and at 32° thereafter. This technique of storage temperatures was adopted with the object of overcoming disorders, chiefly Breakdown. With this technique, there was complete control of Soft Scald, and almost complete control of Breakdown in the Jonathan variety under all conditions of storage, but Breakdown was not controlled in the Delicious variety. Additional temperature of storage experiments with the Jonathan and Delicious varieties showed that much better control of Breakdown was obtained by storing at 40° until the end of April, at 36° during May and at 32° thereafter.

The Rome Beauty, Stewart's, Democrat, and Granny Smith were all stored at 32° continuously.

All varieties kept far better in refrigerated gas storage than in air storage at the same temperatures. Not only was the appearance of the gas-stored lots excellent, but at the end of the year they were still crisp and juicy and of very good flavour typical for the variety.

In gas storage there was practically no loss by disorders in the Jonathan, Rome Beauty, Democrat, and Granny Smith varieties, but there was considerable development of Breakdown in the Delicious and Stewart's variety and in the Delicious, there was Superficial Scald also.

It is estimated that gas storage increased the storage life of all varieties by about 50 per cent. when compared with the air-stored controls, while the various skin-coatings increased storage life by about 25 per cent.

Two of the skin-coatings overcame the storage disorder, Jonathan Spot, while all three coatings seemed to equal oil wraps as a means of overcoming Superficial Scald in Granny Smith apples.

It is suggested that under Victorian practice, it would be advisable to gas-store, in 5 per cent. CO_2, 20 per cent. of the crop for marketing during late October, November, and December. The Granny Smith and Democrat varieties are particularly suitable for the purpose. It is suggested also that a large proportion of the balance be given a suitable skin-coating treatment prior to cool storage to enhance appearance, and maintain condition, i.e., appearance, juice and flavour, much longer than is possible without the skin-coating.

Shade and Shelter for Poultry

The appearance of the poultry farm and the comfort of the birds are considerably improved by the planting of trees.

Big, strong-growing trees should be planted round the boundary fences as a wind break, and smaller trees and shrubs in the runs and passage ways to provide shade in hot weather and shelter in cold weather. Care should be taken however not to plant trees close to buildings.

Before deciding on the kind of trees to plant a careful study should be made of trees which do well in that particular district.

The use of fruit trees can be strongly recommended. If properly managed they combine beauty and usefulness—usefulness not only for shade and shelter but for the fruit they bear. Fruit trees which lose their leaves in the winter should be planted in positions where shade is required in summer and sunshine in winter. Where both shade and shelter are needed all the year round, orange and lemon trees are suitable. Passion fruit vines may be grown on the fences.

Poultry should not be allowed to roost in trees, because it is not possible to control red mite and poultry tick there, especially in trees which have loose curly bark, such as pepper trees.

[Contributed by the Live Stock Division.]

IN THE ORCHARD

Contributed by Officers of the Horticultural Division

Strawberry Growing

DURING the past season, crops of strawberries, although rather lighter than normal because of dry weather, have proved fairly profitable to most growers. The prices have been satisfactory because of the large demand for processing and fresh fruit. However, costs of producing strawberries are high and, under present conditions of labour shortage, it is not possible for growers to plant out large areas. During the past season up to 8d. per pound was paid for strawberries for processing, while fruit packed in punnets for market brought much higher prices.

Because of deterioration due to virus disease, the economic life of a strawberry plantation is limited to three or four years, after which it is necessary to plough up the ground and replant or, preferably, spell the land by growing a crop of vegetables, such as peas or beans.

The best time for planting out strawberry plants is the autumn. At this time of the year, the plant becomes well established before the winter and should be able to produce a crop in the spring. Spring planted runners, on the other hand, do not make sufficient growth before blossoming and it is necessary to remove the blossom in order to allow the plants to make vigorous growth and produce satisfactory crops in the following season.

Soils and Climate.

The strawberry is tolerant of a wide range of soils and climate, but its cultivation in Victoria is confined mainly to the hilly country east of Melbourne, where the rainfall is in the vicinity of 35 inches and the soil is a deep, well-drained, red-brown type of volcanic origin. Strawberries grow well under these conditions. The chief advantage of this district for strawberry culture, however, is the convenience of marketing. The area is served by good roads, and strawberries can be sold at the Victoria Market in Melbourne on the morning after they are picked. There is no reason why strawberries could not be grown adjacent to all the larger towns in the State, provided the site chosen is well-drained and not exposed to severe windstorms. Strawberries grown under irrigation in the northern districts should yield particularly well.

Propagation.

Strawberries are propagated by runners, or side shoots thrown out from the parent plant, which take root and form a separate crown. In order to secure sufficient vigorous runners, it is usual to set aside several rows of healthy plants and remove the blossoms so that runners will grow strongly. Because of the prevalence of virus diseases which seriously affect the bearing of the strawberries, it is important to select runners from healthy plants. Runners from plants with yellowed edges or dark markings on the leaves should be avoided and such plants should be removed and destroyed. It is generally considered that runners are best selected from plants during their first season of growth. Growers, therefore, should set out sufficient runner beds each year to provide for the necessary replanting. Weak runners, and secondary growths from the first runner, should be regularly removed.

Soil Preparation and Cultivation.

Strawberries are shallow rooting plants, but it is important to thoroughly prepare the ground by ploughing and discing in order to give the plants a good start. Spring ploughing, followed by summer fallow with cultivations to reduce weed population, would be of benefit. A further ploughing and cultivation just prior to planting out would be necessary to provide a satisfactory tilth. If a green crop of dun peas, tick beans, tares or vetches can be grown before the final preparation of the soil, this will improve the plantation.

Planting Methods.

Two methods commonly used are the *hill system* and the *matted row*. In the hill system, plants are set out in rows 2 ft. 6 in. to 3 feet apart, with 12 inches between each plant. This method permits of the passage of horse-drawn scufflers, &c., between the rows for weed control. An alternative is to place two rows at 12 inches apart and allow a space of 3 feet between the next two rows. In the hill system, no runners are allowed to develop. The largest quantity of high quality fruit is produced under this system.

The *matted row* system consists of rows planted out 4 feet apart with 2 ft. 6 in. between plants in the row. Runners are allowed to develop

until a mass of plants about 2 feet wide is developed in each row. This system does not enable horse cultivators to be used, and is more suited to a small grower or home gardener. The yield of berries would probably be greater than in the hill system, but the proportion of high quality dessert berries is less.

Setting Out the Runners.

If runners are purchased from a nursery, they should be "heeled in" in a shallow trench with moist soil until required. If the roots are at all dry they first should be dipped in water. Rows should be marked out in the soil by spacing the tynes of a cultivator at the required distance apart, or making a special marker out of timber which can be horse-drawn. Plants, before setting out, should have the roots cut back to three or four inches and all but one or two of the youngest leaves removed. A spade or trowel may be used to open up the soil to a depth of five or six inches, and the roots should be well spread out in the hole. The crown of the plant should be level with the top of the soil. It is important to firm the soil well around the plant by trampling. If the weather is dry, water each runner after planting.

Fertilizers.

Large quantities of fertilizers are used in strawberry production, and, although no direct information is available concerning the best type of fertilizers, up to 5 cwt. of artificial fertilizer, when available, may be used. A complete fertilizer, such as 4 : 4 : 1, containing super., ammonia and potash, or 3 : 1 super-ammonia mixture, is satisfactory. Large quantities of stable manure, i.e., 10 to 15 tons per acre applied before planting and worked into the soil of an established plantation during the spring, can also be recommended.

Mulching.

The quality of strawberries can be improved by mulching around and beneath the plants with straw. Not only does this assist in moisture conservation, but the fruit will be kept off the ground and thus prevented from becoming splashed with mud during rainy weather.

Harvesting.

The main strawberry crop is harvested during November and December, while a smaller crop is picked in March. The plantation should be picked over every second day when the fruit is ripening rapidly, and during the hot weather the berries should be picked over in the morning before they become heated. The fruit should be carefully picked with $\frac{1}{2}$ inch of stalk attached and put straight into clean punnets.

Varieties.

Wilson's Pride is most widely grown in the hills in the vicinity of Melbourne. A large, red, conical berry of excellent flavour, it is well suited for dessert and processing. The fruit does not carry well, and therefore should not be grown where good transport facilities are not available.

Melba bears large crops of well-coloured fruit. This is also a popular variety near Melbourne, but does not carry well.

Tardive de Leopold plants grow strongly and are of upright habit. This variety bears well and fruit is large, conical, and pink to red in colour. Flowers do not bear stamens, and it is necessary to grow alternate rows of some other variety for pollination.

Ettersburgh is of upright habit. The fruit is smaller than the abovementioned varieties, but is firm and carries well, and therefore is well suited for factory purposes.

Sunbeam is a round variety with firm flesh, and therefore a good carrier. Suitable for warm districts because fruit is borne in clusters near centre of plant and is thus protected from sun.

Green Manure Crops

The nitrogen content of the soil is an important factor in determining the productivity of fruit trees, grape vines, and most other plants grown for commercial production. Fruitgrowers, particularly those growing citrus, realize the importance of artificial fertilizers containing nitrogen, such as sulphate of ammonia or nitrate of soda, in maintaining their trees in a state of healthy growth.

The practice of growing a crop of leguminous plants such as tick beans, dun peas, lupins, &c., is also recognized to be of great value in contributing to the nitrogen content of the soil. In these days of fertilizer shortage, this operation is of even more importance than usual.

The nodules formed on the roots of most leguminous plants are actually tiny factories in which bacteria are able to extract nitrogen from the atmosphere and convert it into plant food. The success of this process depends upon the presence of the right strain of bacteria in the soil. For tick beans and dun peas, there is usually an ample supply of the necessary bacteria, but it

has been found that New Zealand blue lupins benefit greatly in growth if the seed is inoculated before planting with a specially selected strain of bacteria.

Most of the plants used for green manuring, such as tick beans and dun peas, are scarce, but New Zealand blue lupins are available. The Biological Branch of the Department of Agriculture will supply quantities of bacterial culture free to growers who wish to plant lupins, together with instructions as to methods of use. Interested growers should write immediately to Biologist, Plant Research Laboratories, Burnley Gardens, indicating the quantity of seed they will be sowing.

Lupins, peas, and beans should be sown at the rate of 1½ bushels per acre. Sowing as early as possible is recommended so that the crop will become well established before the winter.

A ration of superphosphate equivalent to ¾ cwt. per acre of orchard will be available for green manuring. Growers of dried fruits and citrus should secure this ration from their usual agent. Growers of other fruit should apply to the Fertilizer Section, 81 Collins-street, Melbourne, or their local Orchard Supervisor or fertilizer agent for a special application form.

IN THE GARDEN

By J. L. PROVAN, B.Agr.Sc., Principal, School of Horticulture, Burnley Gardens

Ranunculus

THE Ranunculus, which we grow as a spring flowering plant in our gardens, is only one member of a very large family known under this name. The garden type now grown has been evolved from *Ranunculus asiaticus,* which is a native of Southern Europe and Asia. It is possible to obtain flowers of this plant in almost all colours, except blue. For bedding and edging effects, few other flowers can compete in brilliancy with the Ranunculus. It is a plant which likes a loamy soil deeply dug and to which has been added plenty of well decayed manure or leaf mould. An open sunny situation is necessary.

Seed may be sown this month and will produce seedlings which will flower in the spring. Various strains of Ranunculus seed are available—the *Giant Flowered Florentine* has very large flowers, brilliant colours, and long stems. Another strain is the *Giant Camellia Flowered,* which has large double flowers.

Cover the seed with about ¼ inch of soil and place a light mulch or some shading over the seed beds. Another method of planting is to use the tuberous roots. These small claw-like roots should be planted with the claws downwards, at a depth of 1 inch, and spaced 4 to 6 inches apart. Ranunculus flowers reach a height of about 18 inches.

Some members of this large family, e.g., the *Buttercup,* thrive in rather damp situations, but with the garden Ranunculus good drainage is essential if a bright display of flowers is required.

Bulbs

Many home gardeners in the metropolitan area desire to grow hyacinths and tulips. These two bulbs require a fertile and deep soil. Their roots frequently penetrate to a depth of 18 inches and do not like stagnant water; good drainage therefore is another essential for these flowers.

For success with these bulbs the soil should be trenched to a depth of about 2 feet and well rotted organic matter and fertilizers added. When trenching it is important that the area trenched should have some outlet for drainage. To loosen heavy soil in one bed to a depth of 2 feet is only encouraging it to become a pit for holding water during the winter and spring; therefore some underground outlet must be provided from the lower end of the bed.

Hyacinths and tulips grow better in the deep, reddish, hill soils to be found about 30 miles east of Melbourne in the Dandenong Ranges, &c. A cool climate as well as the deep fertile soils suit these bulbs. Most of our Melbourne soils are shallow and infertile, and, therefore, if special care is not taken these two bulbs will be disappointing. Frequently gardeners get a good result the first season from planting large bulbs, but thereafter the bulbs become small, and frequently tulips die out.

Both tulips and hyacinths can be planted at a depth of 4 to 5 inches, depending on the size of the bulb, the large bulbs being planted at the greater depth. Space hyacinth bulbs about 8 inches apart and tulip bulbs 6 inches apart.

Daffodils

Daffodils do not require to be planted at a depth greater than 4 inches. Thorough preparation of the soil beforehand will be repaid by larger blooms and better growth. Bone meal, or if this is unobtainable, bone dust, can be applied at the rate of 3 oz. to the square yard; work it well into the soil before planting the bulb.

There are many different types of daffodils which have been classified on the size, shape and colour of the flowers. Of the large yellow trumpet varieties *Emperor, Garden City,* and *King Alfred* are popular. Of the smaller cupped types *Gloria Mundi* has a flat clear lemon-yellow perianth with a large rich orange-scarlet cup. *Bernardino* has a large, broad, creamy perianth and a large pale cup which is fluted and tinted with apricot-orange colour. *Sir Watkin* has a primrose perianth and a yellow cup slightly tinged with orange. Among the small cupped varieties often coloured with red are *Firefly, Fire Queen, Sunrise* and *Brilliancy.* In the Leedsii group the flower is white or creamy white with a small cup. *Evangeline* has a large white perianth and a clear lemon cup. *Longfellow* has a bright yellow perianth. *Lord Kitchener* broad white perianth and large pale crimson cup. White Lady is medium size but of good form with a white perianth and a pale yellow crinkled cup.

IN THE VEGETABLE GARDEN

Cabbage and Cauliflower

Seedlings of *Drum Head, Early Allhead,* and *East Ham* varieties of cabbage can be planted out now. Space the rows 2 feet 6 inches apart and allow at least 2 feet between the plants in the rows. These young plants after being put out will require protection from the cabbage white butterfly and the cabbage moth. Dust with prepared arsenate of lead dust about every week or ten days, or spray with arsenate of lead, 1 oz. of paste to the gallon of water.

Plants of *Phenomenal Maincrop* cauliflower can be planted out now. Space the plants in rows 3 feet apart and 2 feet 6 inches in the rows. When planting out the young seedlings of cabbage and cauliflower examine each one carefully to ensure that the growing point has not become injured. Occasionally blind seedlings are planted out, and of course these do not head later in the season. If the weather is warm and dry when planting out is done, top and tail the seedlings. This is done by removing the top half of the leaves and tipping the root system. Water well after planting.

Lettuce

Seed of *Webb's Wonderful* and *Imperial D.* lettuce can be planted in seed boxes or in seed beds this month. Do not sow the seed too thickly, and endeavour to grow them as quickly as possible and transplant them to their permanent position as soon as they are large enough to handle. When planting out space the plants 12 inches apart each way.

Silver Beet

A sowing of silver beet can be made now, to provide late autumn greens. Three good varieties are *Fordhook Giant, Dark Green Broad-ribbed,* and *Lucullus.* Sow the seed in drills about 2 feet apart and at a depth of about ¾ inch. A few seeds placed at intervals of 12 inches along the drill will save a good deal of thinning later on.

Turnip

Seed of *White Stone* or *Early Purple Top Munich* can be sown in drills about 18 inches apart and about ¼ inch deep, and *Champion Purple Top Swede* should be sown in drills about 2 feet apart and covered to a depth of about ½ inch.

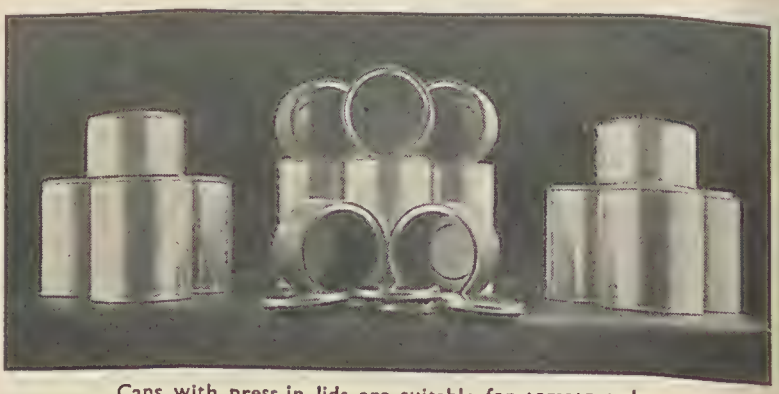
Home Preservation of Tomatoes

By RUTH BROMFIELD, Assistant Fruit Preserving Expert

With tomatoes in season, the housewife will find it worth while to preserve any garden surplus of this nutritious and palatable fruit. Because of the variety of ways in which preserved tomatoes may be used, a stock for out-of-season requirements will prove invaluable. Tomatoes are one of the most satisfactory fruits to preserve, their colour and flavour being fully retained, and because of their acid content they offer little difficulty in preservation.

Pulping

TO preserve tomatoes for use in cooked dishes, soup, &c., the most economical way is to pulp them. The equipment need not be elaborate. A preserving pan and a quantity of jars or tins with press-in lids will serve the purpose. Jars with screw-top lids or bottles with well-fitting corks are excellent also.



Cans with press-in lids are suitable for tomato pulp.

Commence by sterilizing the containers, together with their lids or corks and a cup or jug for ladling. This may be done by placing the articles in a saucepan half-filled with water and allowing 10 minutes after the water has come to the boil. Meanwhile remove the skins from the tomatoes by scalding them with boiling water for 2 minutes and transferring them to cold water. The skins are then easily removed.

The tomatoes may be left whole or quartered. They are put into a preserving pan with a cup of water or crushed tomato, and flavouring if desired, and allowed to boil for 15 to 20 minutes, with the lid on the pan. Fill the hot sterilized containers with the boiling tomato. Seal immediately. It is essential that as little time as possible elapse before the containers are sealed. If tins with press-in lids are used, force the lid into position after filling the tin and pour melted fat or candle grease around the groove of the lid. If bottles with corks are used, the filled bottles with the corks pressed in are turned upside down in the melted fat, sufficient to effect a perfect seal. Jars with screw-top lids may be similarly treated.

If a puree is preferred, the pulp may be strained, but should be reheated to boiling point before bottling.

Bottled Tomatoes

Tomatoes retain their full flavour if bottled in their own juice, without the addition of brine. The tomatoes may be skinned, then packed firmly into jars, with salt, pepper, and sugar added if liked. The jars are sterilized over boiling water for 20 to 25 minutes; then sealed.

Tomato Juice

Tomatoes to be used for tomato juice should be fully ripe, and unnecessary contact with the air should be avoided to prevent deterioration of the vitamin content. Cut up roughly and heat without boiling, preferably in a double boiler until the fruit is soft. Press the tomato through two thicknesses of muslin. Add the following ingredients if desired. To each quart of strained juice, add 1 teaspoon lemonjuice, ¼ teaspoon Worcestershire sauce, a couple of drops of onion juice, ½ teaspoon salt, ½ teaspoon sugar, and 2 or 3 shakes pepper. Reheat without boiling. Pour the liquid into sterilized bottles and process in water (which should reach up to the necks) for 30 minutes at 160°F. (simmering point if a thermometer is not available). Press in the corks and seal with melted tallow.

Recipes

Bottled Tomato Soup

For every 6 lb. firm ripe tomatoes, allow—

1 pint water.
2 small onions.
Pepper and salt to taste.
1 tablespoon sugar.
1 level teaspoon celery seed.
¼ teaspoon bicarbonate soda.
3 teaspoons cornflour.

Put all the ingredients except the soda and cornflour into a preserving pan, and boil gently until the tomatoes are well pulped; then rub through a sieve. Return the strained pulp to the pan, add the soda, and when boiling again add the cornflour (mixed with a little cold water).

Allow the soup to boil for a few minutes to cook the cornflour. Then pour into hot sterilized jars, and seal immediately.

Ripe Tomato Chutney

4 lb. ripe tomatoes.
2 lb. apples.
1 lb. onions.
½ lb. sultanas.
2 teaspoons salt
¼ teaspoon pepper.
½ doz. cloves.
1 small piece whole ginger.
3 small chillies.
1¼ pint vinegar.
1¼ lb. sugar.
1 teaspoon mustard seed.

Peel core and cut up the apples, peel and slice the onions, and tomatoes. Tie the cloves, ginger (bruised), and chillies in a spice bag, and simmer till of a good consistency (about 2 hours).

Tomato Sauce

20 lb. tomatoes.
1½ lb. cored and peeled apples.
1½ lb. sugar.
3 oz. salt.
1 teaspoon cayenne pepper.
1 quart vinegar.
1 oz. cloves.
1 oz. black pepper.
1 oz. garlic.
1 oz. allspice.

Boil tomatoes and apples 1 to 1½ hours. Strain well. Then boil all ingredients for 5 or 6 hours, tying spices in a muslin bag. Pour into hot sterilized bottles.

Tomato and Pineapple Jam

6 lb. ripe tomatoes.
1 pineapple.
6 lb. sugar.
3 lemons.
½ pint water.

Peel and slice the tomatoes, grate the pineapple, and thinly slice the lemon.

Put a small portion of the sugar over the fruit and leave for an hour. Simmer with the water till cooked, about ¾ hour, then add the remainder of the sugar and boil till of a good consistency (about ½ hour).

Rats and Mice in the Poultry Run

Rats and mice are a problem to most poultry farmers. These pests work day and night, causing considerable damage to food, floors, and equipment. As well as inflicting material damage, they contaminate food and water, causing unhealthiness among the birds. Concrete floors can become a hiding place from which rats can conduct their destructive activities.

Practically nothing is immune from rats and mice, and even though efforts are made to control them, they still continue to cause much damage. If no attempt is made to eradicate them, however, the wastage and loss may be considerable.

Concrete floors may be made rat-proof, by placing galvanized iron, concrete, bricks or any other suitable material around the foundations to a depth of 2 ft. below the ground level.

Make all hoppers and food bins rat-proof, and where foodstuffs are stored in bags, always allow sufficient space between the rows or stacks for dogs or cats to work.

Leave no waste food lying round, and conduct regular periodical drives to eradicate these pests, by using reliable poisons or gases which are harmless to fowls.

All equipment used in laying sheds should be moveable and placed in a position that does not afford shelter for rats and mice.

[Contributed by the Live Stock Division.]

Standard Herd Records

For Quarter ended 31st December, 1943

In the following is set out the records of all cows which completed a lactation during the quarter. The number is 278, of which 171 qualified for the certificate. The figure in brackets after the owner's name shows the number of entries.

The amount of butter-fat required for qualification varies with the age class to which the animal belongs, the standard being as follows:—

Junior 2-year-old (under 2½ years at time of calving)	230 lb. butter-fat.
Senior 2-year-old (between 2½ and 3 years at time of calving)	250 lb. butter-fat.
Junior 3-year-old (between 3 and 3½ years at time of calving)	270 lb. butter-fat.
Senior 3-year-old (between 3½ and 4 years at time of calving)	290 lb. butter-fat.
Junior 4-year-old (between 4 and 4½ years at time of calving)	310 lb. butter-fat.
Senior 4-year-old (between 4½ and 5 years at time of calving)	330 lb. butter-fat.
Mature cow (5 years and over)	350 lb. butter-fat.

N.C.K. denotes no chart kept.

Name of Cow.	Herd Book No.	No. of Days in Test.	Milk Last Day of Test. lb.	Milk. lb.	Average Test.	Butter Fat. lb.	Standard Required.	Class.	Previous Yields of Butter Fat.	Sire.
Andrew, W., Whittlesea, Ayrshire (1).										
Scotsburn Pearl	Vol. 36	273	13	5.580	4·03	225·0	230	Jr. 2	..	Scotswood Gordon
Atkinson, W. K., Swan Hill, Dairy Shorthorn (10).										
Willow Park Camelia 44th	C.C.	273	17½	7,343	2·91	213·4	230	Jr. 2	..	Willow Park Barrington 77th
Willow Park Countess 30th	1511c	273	7½	8,696	3·28	285·4	350	Mature	319, 227	Anderson Imperial Cran 6th (Imp.)
Willow Park Duchess 41st	1525c	273	19½	11,975	3·45	413·2	310	Jr. 4	313, 294	Anderson Imperial Cran 6th (Imp.)
Willow Park Duchess 47th	1528c	273	20	9,975	4·07	405·8	270	Jr. 3	344	Anderson Imperial Cran 6th (Imp.)
Willow Park Duchess 56th	C.C.	273	12	5,687	3·61	205·5	230	Jr. 2	..	Willow Park Imperial Cran 10th
Willow Park Melba 35th	1686d	273	30	12,204	3·94	481·2	310	Jr. 4	380, 420	Wicklesham Lord Barrington 5th (Imp.)
Willow Park Moss Rose 20th	1695d	273	14	6,825	3·39	231·3	310	Jr. 4	250, 201	Wicklesham Lord Barrington 5th (Imp.)
Willow Park Moss Rose 26th	C.C.	273	29	9,140	3·00	274·5	230	Jr. 2	..	Wicklesham Lord Barrington 5th (Imp.)
Willow Park Rosebud	243a	273	4	5,802	3·78	219·3	350	Mature	241, 273, 179, 202, 230	Steventon Forster
Willow Park Rosebud 2nd	1448a	273	12	7,899	3·74	295·6	270	Jr. 3	282	Wicklesham Lord Barrington 5th (Imp.)
Ballarat Orphanage, Ballarat, Jersey (9).										
Orphanage Attraction 15th	Vol. 30	273	20	6,988	5·89	411·9	330	Sr. 4	413	Banyule Terraplane
Orphanage Attractive 14th	Vol. 30	273	24	6,194	5·29	327·7	230	Jr. 2	..	Orphanage Centaurus
Orphanage Doris 5th	68457	240 (Sold)	...	5,625	5·00	281·0	350	Mature	255, 283, 475, 394	Jerseylea Quality Boy
Orphanage Handsome 7th	Vol. 30	273	24	6,312	5·65	356·8	230	Jr. 2	..	Orphanage Centaurus
Orphanage Melba 20th	Vol. 30	273	20	5,777	5·93	342·5	250	Sr. 2	..	Clarendon Eyre Oxford Observer
Orphanage Quicksand 13th	73308	273	11	5,117	6·23	318·9	350	Mature	275, 406, 447, 385	Retford King Bracken
Orphanage Quicksand 18th	Vol. 30	273	27	6,038	5·70	343·9	230	Jr. 2	..	Clarendon Eyre Oxford Observer
Orphanage Silvermine 2nd	Vol. 30	273	10	4,564	5·39	246·2	230	Jr. 2	..	Banyule Bungana
Orphanage Zafferine 14th	83303	273	10	5,868	5·54	325·2	270	Jr. 3	351	Banyule Terraplane
Banyule Pty. Ltd., Wangaratta, Jersey (2).										
Banyule Silvermine 135th	75074	273	28	5,250	5·69	299·4	270	Jr. 3	398	Banyule Monoplane
Banyule Tiddlewinks 33rd	75076	273	15	5,282	4·88	257·8	250	Sr. 2	283	Clarendon Eyre Lillilto's Oxford
Bennett, J. W., Yinnar, Jersey (8).										
Ellendale Bluebell 14th	71150	273	N.C.K.	8,269	5·01	414·3	350	Mature	436, 449	Staghorn Bellboy
Ellendale Bluebell 18th	76076	240 (Sold)	..	7,140	5·03	358·8	330	Sr. 4	412, 359	Staghorn Bellboy
Ellendale Bluebell 21st	Vol. 30	240 (Sold)	..	5,235	5·43	284·3	270	Jr. 3	289	Avalon Prince Madeira
Ellendale Bluebell 26th	Vol. 30	273	N.C.K.	5,401	5·37	289·9	230	Jr. 2	..	Avalon Prince Madeira
Ellendale Cloudy 6th	76079	240 (Sold)	..	6,300	5·40	344·9	330	Sr. 4	459, 483	Avalon Prince Madeira
Ellendale Kirsty 50th	Vol. 30	273	N.C.K.	4,922	5·75	282·9	230	Jr. 2	..	Avalon Prince Madeira
Ellendale Romany 17th	Vol. 30	273	N.C.K.	8,925	4·90	437·2	270	Jr. 3	401	Staghorn Bellboy
Ellendale Vanilla 9th	Vol. 30	273	N.C.K.	5,962	4·86	289·6	230	Jr. 2	..	Ellendale Banksia 2nd's Bellboy

Name of Cow.	Herd Book No.	No. of Days in Test.	Milk Last Day of Test. lb.	Milk. lb.	Average Test.	Butter Fat. lb.	Standard Required.	Class.	Previous Yields of Butter Fat.	Sire.
Bennett, R. H., Lancefield, Jersey (2).										
Edenhope Queenie ..	66306	273	25	7,620	6·15	468·5	350	Mature	412, 455, 401	Edenhope Masterpiece
Edenhope Rosetta ..	76038	273	20	6,950	6·03	418·8	310	Jr. 4	482, 391 ..	Edenhope First Choice
Black, Estate of the late I. S., Noorat, Ayrshire (3).										
Mount Noorat Alert 9th ..	32803	273	7	4,512	3·82	172·4	310	Jr. 4	332, 235 ..	Mount Noorat Gerontius
Mount Nootat Balkis ..	35700	273	10	3,615	4·56	165·0	230	Jr. 2	.. ..	Sandhill Kipling (Imp.)
Mount Noorat Georgina 5th	29777	273	23	8,475	4·38	371·2	350	Mature	379, 318, 466, 415, 406	Gowrie Park Scottish Patron
Bott, J., Yarrawonga, Red Poll (4).										
Naranghi Bijou	Vol. 12	273	20½	6,993	3·89	272·0	250	Sr. 2	.. ..	Bundure Whipple
Naranghi Braid	Vol. 12	273	26	7,008	4·41	309·2	230	Jr. 2	.. ..	Bundure Monture
Naranghi Ginette ..	Vol. 12	273	N.C.K.	5,345	3·96	211·8	230	Jr. 2	.. ..	Bundure Wiseboy
Naranghi Vellum ..	Vol. 12	273	N.C.K.	6,215	3·75	233·3	230	Jr. 2	.. ..	Bundure Whipple
Broad, Mrs. A. A., Sutton Grange, Jersey (2).										
Grangelea Rosebud 10th ..	66768	273	22	6,763	5·40	365·2	330	Sr. 4	251, 333, 315	Grangelea Daffodil's Airo
Grangelea Ruby 3rd ..	66766	273	20	6,887	5·25	361·5	350	Mature	328, 344, 291	Grangelea Cream Boy
Bruhn, C. H., Mirboo North, Jersey (1)										
Lumeah Cynthia ..	Vol. 30	273	N.C.K.	6,866	5·80	398·1	350	Mature	.. ..	Hazelgrange Minnie's Master
Butcher, F. T., Swan Hill, Red Poll, (1).										
Maryville Fay	6910A	273	10	8,423	4·14	348·5	350	Mature	218, 290, 343	Temperley Prism
Candler, G. E., Hamilton, Ayrshire (1).										
Jennewar Queenie ..	Vol. 36	273	18½	5,921	4·35	257·4	230	Jr. 2	.. ..	Inverurie Lauchie
Carne, W. J., Pakenham Upper, Jersey (1).										
Navuloa Master's Ladybird	63365	273	18	6,672	5·38	358·8	350	Mature	383, 435, 454	Werribee Grandmaster
Clarke, F. W., Toora, Jersey (2).										
Frankwell Posy	66485	273	N.C.K.	5,541	5·93	328·5	350	Mature	407, 363 ..	Berrington Largo
Mer Vue Choice Variety 2nd	82778	273	N.C.K.	6,461	7·92	511·5	270	Jr. 3	367 ..	Mer Vue Jupiter
Clark, P. W., and Son, Whittlesea, Jersey (3).										
Coodardy Centurion's Liberty	70829	273	35	10,355	5·03	521·0	350	Mature	413, 334, 547	Werribee Centurion
Coodardy Rupert's Liberty	Vol. 30	273	17	5,262	6·01	316·4	230	Jr. 2	.. ..	Brucevale Lord Rupert
Coodardy Wyandotte ..	Vol. 30	273	31	9,111	5·22	475·9	270	Jr. 3	503 ..	Werribee Centurion
Colenso, L. W. R., Alvie, Jersey (5).										
Normandie Hawthorn 19th	78134	273	19½	7,199	5·40	388·9	290	Sr. 3	204 ..	Normandie Majestic
Normandie Hawthorn 23rd	83187	273	20	6,000	4·91	294·6	250	Sr. 2	301 ..	Normandie Majestic
Normandie Ilma 5th ..	58746	273	33½	9,705	4·88	473·8	350	Mature	247, 302, 406, 487	Normandie Majestic
Normandie Ilma 10th ..	73203	273	17	6,819	4·40	300·2	330	Sr. 4	206, 324, 378	Lewisham Playboy
Normandie Thelma 5th ..	58749	273	26½	7,487	5·17	387·4	350	Mature	181, 169, 452, 437, 537	Normandie Majestic
Cook, D. E., Loch, Jersey (1).										
Wattle Vale Bloom ..	64840	273	N.C.K.	5,369	5·79	310·7	350	Mature	397, 178 ..	Ewelme Eileen's Northerner
Coulthard, J. J., Whittlesea, Jersey (4).										
Walamba Lady Bluebell ..	C.R.	273	11½	3,878	5·15	199·6	250	Sr. 2	.. ..	Airlie Don
Walamba Patsy	Vol. 30	273	17	5,046	5·53	278·9	310	Jr. 4	310, 202 ..	Selsey Wonderful Boy
Walamba Precious Jewel ..	Vol. 30	273	6	3,693	5·02	185·4	270	Jr. 3	218 ..	Airlie Don
Walamba Princess Grey ..	C.R.	273	14½	4,274	5·82	248·7	230	Jr. 2	.. ..	Airlie Don
Cowan, G. L. S., Bacchus Marsh, Friesian (4).										
Ingolston Black Nose ..	4708	273	32	12,774	3·89	496·7	350	Mature	461, 473 ..	Cordyline Cremona Pontiac
Ingolston Black Rose ..	5667	273	37½	9,681	3·36	325·2	350	Mature	417, 356 ..	Ingolston Sylvester
Upper Lappan Olga ..	C.R.	273	31	9,131	3·64	332·6	270	Jr. 3	.. ..	Upper Lappan Pontiac
Upper Lappan Tessa ..	C.R.	273	30	8,418	3·26	274·2	250	Sr. 2	.. ..	Upper Lappan Pontiac
Cuddihy, T. D., Geelong, Jersey (2).										
Mount Anakie Doll ..	77873	240 (Sold)	..	3,090	6·36	196·5	290	Sr. 3	234 ..	Mount Violet Count's Rochette
Pivot Pearl 2nd ..	C.R.	273	N.C.K.	4,060	4·72	191·6	230	Jr. 2	.. ..	Belgonia Pioneer
Dennis, Mrs. A. A., Frankston, Jersey (4).										
Ballam Bridget	74999	273	22	6,116	6·48	396·1	250	Sr. 2	345 ..	The Wattles Gamboge Prince
Ballam Empress	75000	273	23½	7,776	5·16	401·4	250	Sr. 2	319	The Wattles Gamboge Prince
Ballam Lilac Domino ..	65286	273	21	7,403	6·17	456·7	350	Mature	335, 432, 465	Clarendon Eyre Oxford Observer
Clarendon Eyre Rose Marie 11th	52266	273	10	5,735	5·37	307·7	350	Mature	389, 395 ..	Rochette's Golden (Imp.)

Name of Cow.	Herd Book No.	No. of Days in Test.	Milk Last Day of Test. lb.	Milk. lb.	Average Test.	Butter Fat. lb.	Standard Required.	Class.	Previous Yields of Butter Fat.	Sire.
Department of Agriculture, Werribee, Friesian (1).										
Victoria Ilkabelle ..	6087	273	N.C.K.	11,424	3·53	402·9	350	Mature	384, 429, 522, 405, 296	Victoria Double Top
Department of Agriculture, Werribee, Red Poll (13).										
Victoria Albatross ..	6707AA	273	N.C.K.	8,474	4·36	369·5	350	Mature	249, 282, 374, 295	Chandpara Valentine
Victoria Bessie	7009A	273	N.C.K.	9,039	3·39	306·4	350	Mature	316, 339, 450, 283	Woodburn Peter Pan
Victoria Demand ..	Vol. 12	273	N.C.K.	7,557	4·57	345·5	250	Sr. 2	.. ..	Woodburn Peter Pan
Victoria Lady Cross ..	Vol. 12	273	N.C.K.	6,011	4·99	300·2	230	Jr. 2	.. ..	Woodburn Peter Pan
Victoria Maid Marion ..	5690AA	273	N.C.K.	7,859	3·99	313·9	350	Mature	316, 437, 445, 426, 349, 371	Woodburn Peter Pan
Victoria Matrimony ..	Vol. 12	273	N.C.K.	6,617	4·38	289·8	330	Sr. 4	287, 241 ..	Woodburn Peter Pan
Victoria Nike	7017A	273	N.C.K.	9,405	3·94	270·8	350	Mature	306 ..	Victoria Gallant
Victoria Petunia	Vol. 12	273	N.C.K.	7,092	4·96	352·0	230	Jr. 2	.. ..	Burnwood Masterpiece
Victoria Phyllis	Vol. 12	273	N.C.K.	6,701	3·83	256·5	230	Jr. 2	.. ..	Burnwood Masterpiece
Victoria Prune	7021A	273	N.C.K.	8,493	4·29	364·7	350	Mature	277, 362, 382, 440	Woodburn Peter Pan
Victoria Reliance ..	Vol. 12	273	N.C.K.	9,096	4·44	404·2	290	Sr. 3	403 ..	Woodburn Peter Pan
Victoria Sphere	Vol. 12	273	N.C.K.	6,242	4·58	285·6	290	Sr. 3	199 ..	Victoria Petrology
Victoria Temple	Vol. 12	273	N.C.K.	8,151	4·32	352·4	250	Sr. 2	.. ..	Burnwood Masterpiece
Desmond, J. J., Rochester, Jersey (2).										
Macroom Farm Lass 5th ..	Vol. 30	273	N.C.K.	6,263	5·36	335·6	310	Jr. 4	346 ..	Clifford Farm Robin Adair
Macroom Skipper's Queen	Vol. 30	273	N.C.K.	4,436	6·45	286·2	270	Jr. 3	275 ..	Clifford Farm V.C's. Skipper
Dookie Agricultural College, Dookie, Ayrshire (2).										
Dookie Bonny	34490	273	N.C.K.	5,954	4·57	272·0	310	Jr. 4	246 ..	Gowrie Park Bonnie Sailor
Dookie Hope	33479	273	N.C.K.	7,511	4·62	346·9	350	Mature	292, 382 ..	Tregorland Indispensible
Dunmore, T. J., Melton, Jersey (2).										
Laura Dell Beth ..	72359	273	12	4,800	6·74	323·4	330	Sr. 4	304, 371 ..	Avalon Gladstar 34th
Laura Dell Petal ..	72362	240	4	4,935	4·23	211·2	350	Mature	279, 317 ..	Brampton Pioneer Chut (Imp.)
Eltringham, W. B., Lilydale, Jersey (2).										
Beverley Bank Princess Marilyn	80311	273	17	6,039	5·58	336·8	250	Sr. 2	332 ..	Clifford Fram Lucky Boy
Clifford Farm Bell ..	75660	273	19	6,297	4·54	285·9	270	Jr. 3	281 ..	Tavistock Quality Lad
Fairchild and Chutterbuck, Tinambra, Jersey (3).										
Fairbank Queenie 3rd ..	61572	273	N.C.K.	5,562	5·08	282·3	350	Mature	276, 343, 250, 327	Fairbank Chorus
Vaucluse Trilby	69525	273	N.C.K.	6,801	5·59	380·2	350	Mature	326, 442, 452, 393	Glen Iris Violin
Vaucluse Viola 2nd ..	Vol. 30	273	N.C.K.	4,577	5·56	254·6	230	Jr. 2	.. ..	Vaucluse Masterpiece
Fixter, A., Boisdale, Guernsey (2).										
Avonview Buttercup 2nd ..	6725	273	18	6,972	5·28	368·4	350	Mature	325, 290, 344, 371	Kentdale Monogram
Avonview Royal Lady ..	8278	273	25	7,982	5·52	440·8	270	Jr. 3	407 ..	Vermont Camilla's Sunrise
Gay, R. G., and Son, Yarram, Jersey (5).										
Elm Grove Golden Dawn	71180	273	N.C.K.	8,723	5·00	436·3	350	Mature	369, 414 ..	Glen Iris Golden Man
Elm Grove Linda 8th ..	76115	273	N.C.K.	7,458	5·36	400·1	330	Sr. 4	306, 366 ..	Glen Iris Golden Man
Elm Grove Songstress ..	76120	273	N.C.K.	8,155	5·75	469·2	310	Jr. 4	334, 484 ..	Gold Star of Melrose
Elm Grove Silvershine ..	71183	273	N.C.K.	5,648	6·44	363·8	350	Mature	290, 394, 407	Gold Star of Melrose
Elm Grove Victorious Dawn	Vol. 30	273	N.C.K.	6,308	4·83	304·9	230	Jr. 2	.. ..	Mornmoot War Victor
Grice, C. S., Somerville, Jersey (1).										
Glenoma Suspense ..	76449	273	N.C.K.	3,137	6·12	191·9	290	Sr. 3	279 ..	Aim High (Imp.)
Handbury, J. E., and Son, Toora, Jersey (1).										
Tooravale Princess 36th ..	79278	273	N.C.K.	4,624	7·15	330·8	310	Jr. 4	388, 370 ..	Tooravale Noble
Hardie, R. B., Lardner, Jersey (4).										
Glen Urquart Golden Banksia	C.R.	273	N.C.K.	6,039	5·23	315·7	230	Jr. 2	.. ..	Bellefaire Golden Chevron
Glen Urquart Northern Holly	Vol. 30	273	N.C.K.	4,785	5·08	243·3	230	Jr. 2	.. ..	Maxmount Danny Boy
Ovalua Creamery ..	Vol. 30	273	N.C.K.	4,028	4·88	196·7	230	Jr. 2	.. ..	Navuloa Magnet's Grandmaster
Ovalau Masterpiece's Cream	73320	273	N.C.K.	7,136	5·24	373·8	330	Sr. 4	333, 436, 482	Staghorn Laburnum's Masterpiece

Standard Herd Records—*continued.*

Name of Cow.	Herd Book No.	No. of Days in Test.	Milk Last Day of Test. lb.	Milk. lb.	Average Test.	Butter Fat. lb.	Standard Required.	Class.	Previous Yields of Butter Fat.	Sire.
Harvey, T., Boisdale, Jersey (10).										
Jerseyholm Bluebell 34th	62306	273	N.C.K.	5,906	5·45	321·6	350	Mature	300, 353, 351, 356	Mornmoot Mars
Jerseyholm Bluebell 54th	71967	273	N.C.K.	5,925	4·94	292·9	270	Jr. 3	297 ..	Mornmoot Memnon 2nd
Jerseyholm Bluebell 67th	81958	273	N.C.K.	7,307	4·57	333·8	230	Jr. 2	.. ..	Orphanage Molly's Commander
Jerseyholm Bluebell 69th	81959	273	N.C.K.	6,452	4·67	301·2	230	Jr. 2	.. ..	Mornmoot Memnon 2nd
Jerseyholm Empress 78th	81960	273	N.C.K.	5,306	5·86	311·1	230	Jr. 2	.. ..	Orphanage Molly's Commander
Jerseyholm Kirsty 41st ..	71977	273	N.C.K.	5,620	5·40	303·2	290	Sr. 3	280 ..	Mornmoot Memnon 2nd
Jerseyholm Kirsty 42nd ..	71978	273	N.C.K.	6,009	5·44	326·7	270	Jr. 3	268 ..	Orphanage Molly's Commander
Jerseyholm Kirsty 43rd ..	81967	273	N.C.K.	5,931	4·88	289·5	230	Jr. 2	.. ..	Orphanage Molly's Commander
Jerseyholm Lady Marge 17th	67197	273	N.C.K.	7,119	5·54	394·1	350	Mature	278, 131, 250	Rowallan Silvanite
Jerseyholm Lady Marge 19th	71979	273	N.C.K.	7,003	5·69	398·4	310	Jr. 4	288, 319 ..	Orphanage Molly's Commander
Haywood, Dr. A. R., Hastings, Jersey (1).										
Windrest Gadget's Rose ..	Vol. 30	273	N.C.K.	6,846	5·55	380·1	270	Jr. 3	.. ..	Gadget (Imp.)
Higgins, J. A. A., Keysborough, Guernsey (1).										
Kentdale Myrtle	5631	273	13	5,424	4·64	251·9	350	Mature	243, 299 ..	Kentdale Tomboy
Hodgins, G. E., Hastings, Jersey (3).										
Verjean Vesta 2nd ..	84400	273	15	5,637	5·20	293·3	250	Sr. 2	268 ..	St. John's Letetia 10th's Chut
Verjean Virginia 3rd ..	Vol. 30	273	17	5,835	5·44	317·2	250	Sr. 2	311 ..	St. John's Letetia 10th's Chut
Verjean Vanity 2nd ..	74360	273	16	6,513	5·54	360·9	290	Sr. 3	287, 316 ..	Jorian Great Boy
Hore, E., Leitchville, Jersey (2).										
Milvue Aim's Honesty 6th	Vol. 30	273	N.C.K.	7,305	5·39	394·0	250	Sr. 2	.. ..	Belgonia Peggy 11th's Aim
Milvue Roseleaf 4th ..	Vol. 30	273	N.C.K.	5,702	5·01	285·5	230	Jr. 2	.. ..	Belgonia Suspense's Design
Hore, M. T., Horefield, Friesian (3).										
Elmar Majoe	Vol. 15	273	N.C.K.	13,760	2·75	378·7	350	Mature	382, 414, 553, 406	Greenvale Oakwood Posch
Elmar Rock Keys ..	C.R.	273	N.C.K.	10,175	3·11	316·2	350	Mature	340, 339, 439	Burnbank Iona Rock
Kurrajong Multi Majoe 5th	Vol. 15	273	N.C.K.	10,884	3·11	338·1	290	Sr. 3	235 ..	Elmar Majoe Galatea
Hurrey, Estate of the late W. H., Koonwarra, Jersey (5).										
Kooreena Audrey 16th ..	77242	273	12	4,976	5·50	273·6	310	Jr. 4	264, 305 ..	Kooreena Rover 3rd
Kooreena Carrie 8th ..	62625	273	22	6,533	6·03	394·2	350	Mature	345, 444, 386, 420	Kooreena Mourier's King 2nd
Kooreena Maranta 21st ..	Vol. 30	273	22	4,986	5·74	286·2	230	Jr. 2	.. ..	Kooreena Carrie 4th's Laddie
Kooreena Yo Yo 4th ..	67489	273	6½	4,302	5·99	257·8	350	Mature	353, 369, 348	Kooreena Good Luck
Kooreena Yo Yo 6th ..	72282	273	14½	4,034	6·19	249·8	350	Mature	291, 306, 272	Kooreena Rover 3rd
Johnson, F. G., Horsham, Jersey (2).										
Orphanage Clara 7th ..	73300	273	N.C.K.	5,681	5·61	318·9	350	Mature	343 ..	Banyule Silverstone
Thurso Treasure	69366	273	N.C.K.	5,132	5·08	260·8	350	Mature	345 ..	Thurso Pretty Oxford
Langlands, F. G., Horsham, Jersey (2).										
Brierwood Flowergirl 5th ..	65635	273	N.C.K.	5,225	5·01	261·8	350	Mature	405, 370 ..	Murona Twylair
Brierwood Golden Millie ..	75352	273	N.C.K.	6,449	5·30	341·6	350	Mature	400, 377 ..	Murona Twylair
Lind, A. E., Mt. Taylor, Jersey (2).										
Nenagh Foxglove 4th ..	Vol. 30	273	9	7,077	5·27	373·2	250	Sr. 2	292 ..	Kyora Adore's Volunteer
Nenagh Trinket 3rd ..	54440	273	33	8,639	4·61	398·6	350	Mature	.. ..	Nenagh Twylish Concentration
Linke, H. P., Tarrington, Dairy Shorthorn (1).										
Corresdean Beauty 2nd ..	C.C.	273	16½	5,304	3·83	203·3	230	Jr. 2	.. ..	Drumneil Prince 3rd
Longerenong Agricultural College, Dooen, Ayrshire (4).										
Longerenong Acacia Flata 6th	32768	273	22	7,182	4·44	318·9	310	Jr. 4	.. ..	Dookie Punch
Longerenong Cootamundra Wattle 8th	32772	273	17	6,801	4·50	305·8	290	Sr. 3	309 ..	Dookie Signet
Longerenong Cootamundra Wattle 9th	33863	273	4½	2,684	4·72	126·8	270	Jr. 3	200 ..	Dookie Signet
Longerenong Laureate 6th	34855	273	21	6,222	4·50	279·7	250	Jr. 2	.. ..	Dookie Punch

Name of Cow.	Herd Book No.	No. of Days in Test.	Milk Last Day of Test. lb.	Milk. lb.	Average Test.	Butter Fat. lb.	Standard Required.	Class.	Previous Yields of Butter Fat.	Sire.
Lyon, Estate of the late W. H., Sale, Jersey (4).										
Avon Colleen	C.R.	273	N.C.K.	6,428	4·88	313·6	250	Sr. 2	325 ..	Avon Ruby's Count
Avon Princess Donna ..	79455	210 (Sold)	..	5,325	6·41	341·3	310	Jr. 4	270, 401 ..	Ruby's Beau (Imp.)
Avon Princess Sparkle ..	C.R.	240 (Sold)	..	7,597	5·44	413·3	290	Sr. 3	334 ..	Ruby's Beau (Imp.)
Avon Wallflower ..	C.R.	273	N.C.K.	5,787	6·07	351·2	270	Jr. 3	351 ..	Ruby's Beau (Imp.)
Macauley, C. W. W., Rochester, Jersey (3).										
Taranah Flora 9th ..	Vol. 30	273	N.C.K.	3,871	4·97	192·5	230	Jr. 2	.. ..	Five Gums King Lark
Taranah Flora 10th ..	C.R.	273	N.C.K.	4,268	5·78	246·5	230	Jr. 2	.. ..	Five Gums King Lark
Taranah Floss 8th ..	C.R.	273	N.C.K.	4,158	5·02	246·2	230	Jr. 2	.. ..	Five Gums King Lark
McCormack, M., and Sons, Mansfield, Red Poll (1).										
Cypress Marsellaise ..	5121C	273	N.C.K.	6,287	3·27	205·5	350	Mature	340, 361 ..	Woodburn Glennie
McKenzie, Mrs. E. J., and Son's Woodford, Jersey (6).										
Kameruka Hope Ever ..	67282	273	16	6,291	4·85	305·3	350	Mature	267 ..	Hedwin (Imp.)
Spring Valley Dillwynia ..	78920	273	11	5,923	5·28	313·0	330	Sr. 4	273 ..	Samare's Golden Prince (Imp.)
Spring Valley Dillwynia 3rd	Vol. 30	273	19½	5,734	4·75	272·3	250	Sr. 2	.. ..	Selsey Gay Prince
Spring Valley Sally 2nd ..	83926	273	9	4,029	5·58	224·9	270	Jr. 3	245 ..	Selsey Gay Prince
Spring Valley Virginia 49th	83927	273	9	4,594	4·78	219·4	290	Sr. 3	244 ..	Selsey Gay Prince
Spring Valley Virginia 50th	Vol. 30	273	13	4,881	5·74	280·0	250	Sr. 2	.. ..	Selsey Gay Prince
McNabb, G. A., and Son, Irrewillipe East, Jersey (6).										
Maxon Bright Princess ..	Vol. 30	273	N.C.K.	4,641	5·03	233·6	230	Jr. 2	.. ..	Maxon Pansy's Starbright
Maxon S.B's Marie ..	Vol. 30	273	N.C.K.	4,695	4·88	228·9	230	Jr. 2	.. ..	Maxon Light's Starbright
Maxon Starbright's Pansy	77633	273	N.C.K.	6,578	4·92	323·6	290	Sr. 3	305, 328 ..	Avalon Starbright 8th
Maxon Starbright's Pansy 4th	Vol. 30	273	N.C.K.	5,828	5·11	298·1	230	Jr. 2	.. ..	Maxon Light's Starbright
Maxon Sweet Estelle ..	54029	273	N.C.K.	6,602	5·17	341·1	350	Mature	285, 397, 326, 488, 455, 386	Maxon Count's Graceful
Xavier Dolichos	Vol. 31	273	N.C.K.	6,914	5·96	412·4	330	Sr. 4	408 ..	Bellefaire Blonde's Bellazanne
Manly, R. A. A., Somerville, Dairy Shorthorn (1).										
River Glen Clarabelle 7th	1983E	273	15	7,172	3·72	267·1	350	Mature	361, 342 ..	Dorrie's Royal of Wangara
Mason, V. J., Ferntree Gully, Guernsey (1).										
Osmaine Iris 2nd ..	11202	273	N.C.K.	5,574	5·03	280·3	230	Jr. 2	.. ..	Yarraview Masher
Meaklin Bros., Mooroopna, Dairy Shorthorn (6).										
Drumneil Heiress ..	C.C.	273	N.C.K.	5,576	3·63	202·3	230	Jr. 2	.. ..	Willow Park Barrington 46th
Drumneil Lily 4th ..	C.C.	273	N.C.K.	9,198	3·86	355·5	230	Jr. 2	.. ..	Willow Park Barrington 46th
Drumneil Lucy	1847E	273	N.C.K.	9,648	4·10	395·3	330	Sr. 4	304, 337 ..	Willow Park Lustre 3rd
Drumneil Nellie 3rd ..	779E	273	N.C.K.	11,856	3·42	406·0	350	Mature	328, 453, 367, 454, 353, 417, 395	Willow Park Reformer
Drumneil Nellie 6th ..	1844E	273	N.C.K.	11,658	3·75	436·7	310	Jr. 4	320, 300 ..	Willow Park Lustre 3rd
Drumneil Princess 6th ..	1853E	273	N.C.K.	9,011	4·40	396·2	350	Mature	325, 227, 341	Willow Park Lustre 3rd
Methodist Central Mission, Lilydale, Guernsey (1).										
Melbourne Golden Waterlily	7428	273	9	5,832	4·53	264·4	330	Sr. 4	243, 302, 384	Nundorah Daredevil
Mitchell, R. H., Linton, Jersey (1).										
Clifford Farm Rita ..	75663	273	20	7,170	6·40	459·2	290	Sr. 3	482 ..	Clifford Farm Skipper
Moore, J., and Co., Yarram, Jersey (5).										
Clarendon Eyre Rose Marie 14th	56810	273	N.C.K.	5,355	5·68	304·3	350	Mature	247, 104, 140, 260	Clarendon Eyre Oxford Gamboge 2nd
Tooloonook Molly 12th ..	59758	273	N.C.K.	5,202	4·63	240·8	350	Mature	256, 241, 322, 280, 240, 299	Anfield Diadem's Masterpiece
Tooloonook Peach 12th ..	79254	273	N.C.K.	5,196	5·92	307·8	350	Mature	193, 217, 372	Belgonia Lady's Duke
Tooloonook Plumbago 9th	74212	273	N.C.K.	5,745	5·53	302·6	350	Mature	276, 305, 402	Latrobe Musician
Tooloonook Polygold 2nd	84237	273	N.C.K.	5,657	5·14	290·7	350	Mature	461 ..	Latrobe Musician
Murdoch, J., and Son, Lismore, Jersey (2).										
Ismalia Countess 2nd ..	67120	273	25	7,310	6·15	449·3	350	Mature	293, 451 ..	Retford King Bracken
Ismalia Countess 4th ..	71887	273	19	5,399	6·28	339·1	330	Sr. 4	319, 273 ..	Orphanage Charger
Nancarrow Bros., Kerang, Jersey (2).										
Pine Ridge Duke's Silvermine	68649	273	N.C.K.	10,517	4·97	522·9	350	Mature	371, 472, 536, 492	Duke of the Lake (Imp.)
Pine Ridge Silvermine 8th	78466	210 (Sold)	..	4,170	4·94	205·9	270	Jr. 3	221 ..	Belgonia Peggy 9th's King

Name of Cow.	Herd Book No.	No. of Days in Test.	Milk Last Day of Test. lb.	Milk. lb.	Average Test.	Butter Fat. lb.	Standard Required.	Class.	Previous Yields of Butter Fat.	Sire.
Nicholas, M. A., Sherbroke, Jersey (5).										
Selsey Great Beauty ..	83374	273	21½	5,438	5·64	306·5	230	Jr. 2	.. ..	Selsey Great Prometheus
Selsey Princess Wyandotte	64223	273	11	5,687	5·94	337·7	350	Mature	382, 390, 421, 384	Selsey Brampton Boy
Selsey Rowan 4th ..	78881	273	20½	6,016	5·65	340·2	270	Jr. 3	270 ..	Brampton Son of Champions (Imp.)
Selsey Royal Wyandotte 2nd	78884	273	15	4,367	5·60	244·6	270	Jr. 3	313 ..	Selsey Right Royal
Selsey Samares Starbright	69070	273	26	8,028	5·70	457·7	350	Mature	363, 381, 435	Samares Golden Prince (Imp.)
Nicholson, A. N., Moorooduc, Illawarra Shorthorn (3).										
Veresdale Cherry 2nd ..	33736	273	N.C.K.	6,117	3·47	212·3	270	Jr. 3	284 ..	Ovensdale Pearl's Renown
Veresdale Dahlia ..	33739	273	N.C.K.	7,287	3·86	281·2	270	Jr. 3	277 ..	Ovensdale Pearl's Renown
Veresdale Posey	C.R.	273	N.C.K.	7,398	3·83	283·7	270	Jr. 3	257 ..	Numbawarra Maiden's Sultan
Noonan, G., Benalla, Jersey (1).										
Noonavale Noble Beauty ..	Vol. 30	273	16	4,835	5·44	263·1	230	Jr. 2	.. ..	Maroona Model's Noble
O'Neill, J. Echuca, Jersey (1).										
Ullina Satisfaction's Buttercup	84343	273	23	6,743	5·63	382·9	250	Sr. 2	336 ..	Mornmoot Satisfaction's Warrior
Parker, L. M., Tallarook, Dairy Shorthorn (5).										
Deep Dale Beryl ..	C.C.	273	11	8,208	3·85	316·3	290	Sr. 3	275 ..	Willow Park Barrington 26th
Deep Dale Bonnie 2nd ..	C.C.	273	N.C.K.	6,555	3·84	251·5	250	Sr. 2	.. ..	Willow Park Barrington 26th
Deep Dale Cherry 2nd ..	1803E	273	N.C.K.	8,895	4·26	379·3	350	Mature	387, 463, 334	Willow Park Banker 3rd
Deep Dale Sally 2nd ..	C.C.	273	N.C.K.	7,640	4·30	328·7	290	Sr. 3	273 ..	Willow Park Barrington 26th
Deep Dale Star	1820E	90	4	2,460	4·03	99·2	350	Mature	299, 301, 421	Willow Park Banker 3rd
Parkes, E. F., Merton, Jersey (2).										
Irona Benedictine Diana ..	Vol. 30	240 (Sold)	..	2,445	6·00	146·7	230	Jr. 2	.. ..	Irona Beau Vallet
Irona Dreaming Cowslip ..	71881	210	4	3,615	5·32	192·3	350	Mature	263, 224, 226	Dreamer's Hamptonne Star (Imp.)
Pattison, G., Tongala, Ayrshire (1).										
Willow Park Janet ..	Vol. 36	273	20	7,040	3·98	279·9	230	Jr. 2	.. ..	Fulham Viscount
Payne, A. E. T., Lilydale, Guernsey (3).										
Yarraview Carol	9761	273	12½	5,303	4·87	258·1	290	Sr. 3	339 ..	Honorias' Benefactor (Imp.)
Yarraview Honour ..	9777	273	18	8,022	4·41	353·4	290	Sr. 3	359 ..	Camilla's Majestic of Maple Lodge (Imp.)
Yarraview Siren	6643	273	36	10,793	5·42	584·7	350	Mature	407, 520, 528, 574, 520	Camilla's Majestic of Maple Lodge (Imp.)
Phillips, J. H., Swan Hill, Jersey (1).										
Rylands Wallflower ..	73340	273	25	8,901	5·64	501·8	350	Mature	305, 377, 419	Banaview Master
Powell, T. S., Mansfield, Jersey (2).										
Carellen Lady Starbright ..	65877	273	21	7,613	5·79	440·7	350	Mature	419, 548, 556	Darnum Park Lord Starbright
Carellen Melody 2nd ..	75608	273	15	6,923	5·00	346·3	270	Jr. 3	333, 456 ..	Mornmoot Magistrate
Reid, Miss B. B., Bundoora, Jersey (6).										
Jubilee Celsia	81994	273	10	2,628	5·85	153·7	270	Jr. 3	300 ..	Jubilee Torchlight
Jubilee Leontopodium ..	72014	273	8	3,225	5·30	170·8	230	Jr. 2	.. ..	Jubilee Richlight
Jubilee Lespedeza ..	81999	273	16	4,086	6·18	252·4	270	Jr. 3	234 ..	Jubilee Richlight
Jubilee Liatris	67238	273	15	4,983	5·42	270·1	350	Mature	336 ..	Werribee Stylish Masterpiece
Jubilee Taxodium ..	72016	273	12	4,846	5·53	268·0	350	Mature	305 ..	Jubilee Richlight
Jubilee Wivelsfield ..	Vol. 30	273	10	3,558	5·17	183·9	230	Jr. 2	.. ..	Jubilee Richlight
Ronalds, O., and Son, Tarago, Jersey (1).										
Jindivick Valencia ..	81984	273	26	7,674	5·18	397·6	250	Sr. 2	345 ..	Jindivick Airman
Ross, D. M., Croydon, Dairy Shorthorn (4).										
Namoi Queenie 15th ..	C.C.	273	21	5,045	3·80	191·9	230	Jr. 2	.. ..	Willow Park Duke 18th
Willow Park Damsel 16th	C.C.	273	15	5,781	3·25	187·6	230	Jr. 2	.. ..	Anderson Imperial Cran 6th (Imp.)
Willow Park Duchess 55th	C.C.	273	16	5,463	3·46	188·8	230	Jr. 2	.. ..	Willow Park Barrington 77th
Willow Park Fairy 13th ..	1680D	273	25	10,224	3·66	374·1	350	Mature	335, 383, 350	Anderson Imperial Cran 6th (Imp.)
St. Joseph's Home, Sebastopol, Jersey (1).										
St. Joseph's May ..	Vol. 30	273	7	3,906	5·96	232·8	270	Jr. 3	279 ..	Selsey Design's Standard
Smith, R. W., and Son, Swan Hill, Friesian (2).										
Wattle Bank Ashly ..	C.R.	273	20	9,109	2·98	271·9	270	Jr. 3	262 ..	Wattle Bank Segis De Kol
Wattle Bank Carolino ..	C.R.	273	24	8,477	2·93	248·7	230	Jr. 2	.. ..	Wattle Bank Oakview Segis
Stephens, Dr. F., Vermont, Guernsey (1).										
Vermont Joybelle ..	11746	240 (Sold)	..	3,750	5·30	198·8	270	Jr. 3	.. ..	Werribee Burmil Pruid

Name of Cow.	Herd Book No.	No. of Days in Test.	Milk Last Day of Test. lb.	Milk. lb.	Average Test.	Butter Fat. lb.	Standard Required.	Class.	Previous Yields of Butter Fat.	Sire.
Tait, W. G., Dreelte, Jersey (5).										
Stonybank Belladonna ..	73956	273	25¼	7,907	4·82	381·1	310	Jr. 4	321, 435 ..	Design's Golden Oxford (Imp.)
Stonybank Gaiety Girl 13th	83976	273	14	4,782	5·51	263·4	230	Jr. 2	.. ..	Mornmoot Marius 2nd
Stonybank Jessie 8th ..	83978	273	11½	4,764	5·75	274·3	230	Jr. 2	.. ..	Mornmoot Marius 2nd
Stonybank Snowdrop 7th	83979	273	17	6,321	5·21	329·3	230	Jr. 2	.. ..	Mornmoot War Ward
Stonybank Snowdrop 8th	83980	273	19	5,577	5·83	325·4	230	Jr. 2	.. ..	Mornmoot Marius 2nd
Tandberg, G., and Son, Warragul, Illawarra Shorthorn (2).										
Veresdale Lulu	28363	273	N.C.K.	6,561	3·80	249·3	350	Mature	245, 323, 324	Veresdale Diamond
Teychenne and Ducret, Wesburn, Guernsey (1).										
Meadow Vale Bouquet ...	10872	240	..	6,435	4·58	294·7	270	Jr. 3	235 ..	Yarraview Marvel
Tomasetti, B. G., Drouin West, Ayrshire (2).										
Emoh Ruo Marice ..	Vol. 36	273	17	5,621	3·82	214·9	230	Jr. 2	.. ..	Fulham Ventriloquist
Glencorren Fine Quality ..	Vol. 36	273	29	7,623	4·23	322·1	230	Jr. 2	.. ..	Glencorren Peerie
Tyssen, C. J., Warragul, Jersey (3).										
Hylsbroke Daffodil ..	57731	210 (Sold)	..	4,410	5·45	240·3	350	Mature	444, 367 ..	Latrobe Starjoy
Hylsbroke Sunbeam 2nd ..	Vol. 30	273	16	4,623	4·53	209·3	230	Jr. 2	.. ..	The Wattles Young Gamboge
Somerville Primrose 2nd ..	73913	273	21	5,645	6·14	346·5	350	Mature	325, 355, 362	Brampton Pioneer Chut (Imp.)
Unthank, Miss Freda, Hastings, Jersey (1).										
The Hollies Fancy ..	59666	180	4	3,630	4·67	169·4	350	Mature	451 ..	St. John's Jewel 3rd's Investor
Vaughan Bros., Girgarre Jersey (1).										
Lynroy Fancy 5th ..	Vol. 30	273	N.C.K.	6,038	6·53	394·4	270	Jr. 3	347 ..	Werribee Laverock
Wade, W. J., Stratford, Jersey (4).										
Inverbroom Golden Marie	76912	273	N.C.K.	6,482	5·19	336·7	290	Sr. 3	315 ..	Clarendon Eyre Eminent's Boomerang 4th
Inverbroom Molly's Bunty	57762	273	N.C.K.	6,179	4·97	307·2	350	Mature	289, 335, 388, 408, 419	Grangelea Butter Boy 3rd
Inverbroom Ruby's Marie	67091	273	N.C.K.	9,660	4·89	472·5	350	Mature	508, 442, 483	Inverbroom Marie's Majesty
Troed-yr-Rhiw Fydd 9th ..	64655	273	N.C.K.	6,635	4·76	315·5	350	Mature	184, 344, 334, 308	Clarendon Eyre Eminent's Boomerang, 4th
Walker, C. S., Swan Hill, Friesian (1).										
Warwick Only Patch ..	C.R.	273	N.C.K.	9,434	3·24	306·0	230	Jr. 2	.. ..	Elmar Iona Patch
Walker, C. S., Swan Hill, Jersey (14).										
Clarendon Eyre Happy Days 6th	65945	273	N.C.K.	7,451	4·53	337·2	350	Mature	287, 380, 334, 366	Clarendon Eyre Eminent's Lohengrin
Clarendon Eyre Love Lies 9th	65950	273	N.C.K.	5,885	4·66	274·2	350	Mature	226, 338, 362, 390	Clarendon Eyre Golden Oxford
Grangelea Rose Petal 2nd	53022	273	N.C.K.	5,166	5·89	304·5	350	Mature	321, 371, 288, 454, 398, 347	Grangelea Cream Boy
Warwick Beauty 10th ..	79522	273	N.C.K.	7,082	5·29	374·3	310	Jr. 4	344, 411 ..	Leven Brae A'do Masterpiece
Warwick Bellbird 6th ..	79523	273	N.C.K.	5,966	4·94	294·9	310	Jr. 4	256, 304 ..	Leven Brae A'do Masterpiece
Warwick Cello 2nd ..	79524	273	N.C.K.	6,986	5·54	386·8	310	Jr. 4	339, 360 ..	Leven Brae A'do Masterpiece
Warwick Cream Stockings 2nd	69627	273	N.C.K.	8,031	5·23	420·3	350	Mature	334, 441, 507	Warwick Golden Lord
Warwick Cream Stockings 8th	84487	273	N.C.K.	5,423	6·02	326·3	290	Sr. 3	.. ..	Leven Brae A'do Masterpiece
Warwick Cream Stockings 12th	C.R.	273	N.C.K.	3,670	4·87	178·7	230	Jr. 2	.. ..	Selsey Design's Foremost
Warwick Design's Finesse	79527	273	N.C.K.	6,531	5·25	343·1	310	Jr. 4	370, 402 ..	Leven Brae A'do Masterpiece
Warwick Polly 16th ..	C.R.	273	N.C.K.	4,823	5·01	241·5	270	Jr. 3	.. ..	Leven Brae A'do Masterpiece
Warwick Polly 23rd ..	C.R.	210	N.C.K.	3,465	5·57	192·9	230	Jr. 2	.. ..	Warwick Master Stroke
Warwick Princess 12th ..	79530	150	N.C.K.	3,525	4·55	160·3	330	Sr. 4	300, 293 ..	Warwick Golden Lord
Warwick Rose Petal ..	84494	273	N.C.K.	6,621	5·31	351·6	310	Jr. 4	300, 338 ..	Warwick Golden Lord
Waterhouse, H. W., and Son, Pakenham, Jersey (6).										
Navuloa Grand Bell ..	83098	273	14½	4,812	4·92	236·8	230	Jr. 2	.. ..	Navuloa Magnet's Grandmaster
Navuloa Magnetic ..	63361	273	16½	6,275	5·27	330·5	350	Mature	461, 428, 448	Werribee Grandmaster
Ovalau Chocolate Cream ..	Vol. 30	273	21	6,440	5·61	361·3	230	Jr. 2	.. ..	Ovalau Magnet's King
Ovalau Creamy	Vol. 30	273	21	5,886	4·44	261·2	230	Jr. 2	.. ..	Navuloa Magnet's Grandmaster
Ovalau Mantis	Vol. 30	273	18½	4,664	5·18	241·4	230	Jr. 2	.. ..	Navuloa Magnet's Grandmaster
Ovalau Wyandotte's Cream	78279	273	24	6,936	5·72	396·4	310	Jr. 4	299, 422 ..	Brucevale Wyandotte's King

Name of Cow.	Herd Book No.	No. of Days in Test.	Milk Last Day of Test. lb.	Milk. lb.	Average Test.	Butter Fat. lb.	Standard Required.	Class.	Previous Yields of Butter Fat.	Sire.
Whelpton, B., Whittlesea, Jersey (8).										
Coodardy Centurion's Mona	C.R.	273	18	5,826	4·68	272·9	230	Jr. 2	.. ..	Werribee Centurion
Coodardy Lady .. .	Vol. 30	273	13	5,936	5·53	328·5	250	Sr. 2	350 ..	Brucevale Lord Rupert
Coodardy Lady Gloria ..	C.R.	273	18	5,892	5·65	333·1	250	Sr. 2	.. ..	Brucevale Lord Rupert
Hemswell Babe	Vol. 30	273	20¼	6,366	5·16	328·4	270	Jr. 3	318 ..	Clarendon Eyre Eminent's Moon 2nd
Hemswell Richlight Cowslip	Vol. 30	273	17	5,993	4·61	276·4	250	Sr. 2	210 ..	Jubilee Richlight
Hemswell Sally	Vol. 30	273	16	5,015	5·22	262·0	250	Sr. 2	262 ..	Clarendon Eyre Eminent's Moon 2nd
Neerod Master's Queen ..	83107	273	14	4,934	6·63	327·3	290	Sr. 3	442 ..	Navuloa Ladybird's Masterpiece 2nd
Wattle Grove Jeanette 2nd	55801	273	10	5,403	5·40	291·8	350	Mature	429, 345 ..	Fairview Chief
Williams, Estate of the late F. A., Bamawm Extension, Jersey (1).										
Bamawm Daisy Bell ..	70172	273	N.C.K.	5,848	5·75	336·5	350	Mature	317, 405 ..	Bamawm Bonnie Bugler
Wilson, A., Port Fairy, Ayrshire (5).										
Carracoorte Viola 34th ..	29211	273	15	5,175	4·28	222·1	350	Mature	247, 299, 337, 310	Grand View Bernie
Gowrie Park Music ..	27328	273	9	6,020	4·05	243·8	350	Mature	308, 274, 291, 206	Gowrie Park Scottish Standard
Lough View Beauty 2nd ..	32776	273	22	7,257	3·71	268·9	350	Mature	194, 264 ..	Carracoorte Bobby
Lough View Music 2nd ..	35685	273	18	6,527	4·02	262·3	310	Jr. 4	259 ..	Carracoorte Bobby
Lough View Viola ..	32780	273	14	5,432	3·89	211·1	350	Mature	205, 251 ..	Carracoorte Bobby
Woodyer, P. A., Mornington, Jersey (3).										
Carramar Lady Mercedes 4th	80699	273	12	3,675	6·49	238·5	290	Sr. 3	324 ..	Waloma Viking
Rochdale La Mascotte 3rd	73708	273	21	6,543	4·94	323·5	330	Sr. 4	296 ..	Rochdale Lord
Selma Charm	83866	273	12	4,779	5·48	262·1	270	Jr. 3	234 ..	Glen Iris Golden Viol

Castration of Colts

The ideal age for castration of colts is from one to two years of age. Foals may be done, but suffer the disadvantage that abnormalities such as scrotal and inguinal herniae are more common than at a later age.

Owners will usually have a preference for a certain casting gear. On casting, the site of operation is cleansed, preferably with warm water and soap, and then disinfected with alcohol and weak tincture of iodine. Oily disinfectants suffer the disadvantage that the scrotum is made slippery, and hence cannot be comfortably held.

Various types of castration knives may be used successfully, being sterilized by immersion in a suitable disinfectant, while the emasculators, artery forceps, suture needles, and suture silk (used for tying off blood vessels) are sterilized by boiling in water for ten minutes. Hands should be washed first and then disinfected.

Palpation of the scrotum should first be made to determine whether any abnormality exists. Assuming that no abnormality is present, the scrotum is incised, incision being continued through the outer envelopes of the testis, retention of the scrotum being made the while. The smaller testis is preferably removed first. After incision, the whitish-looking ligament is cut through, while the emasculator is applied, right side up to the cord and blood vessels, which are then crushed.

Exercise should be given daily if the animal is stalled, but preferably the animal should be turned out.

Where profuse bleeding is encountered after the operation, as, for example, when emasculators have been incorrectly used, it is necessary to clamp the bleeding vessels with artery forceps and then ligate them.

[G. NICOL, B.V.Sc., Veterinary Officer.]

Tubercle-free Herds

Accredited Tubercle-free Herds.

The following herds have been declared free of tuberculosis under the *Accredited Tubercle-free Herd Scheme* conducted by the Department of Agriculture. Under this scheme a tubercle-free accredited herd of cattle is one in which the entire herd has passed two negative, successive, annual physical examinations and tuberculin tests, or upon disclosure of infection, three semi-annual, successive physical examinations and tuberculin tests applied by a State Veterinarian or by a qualified and registered veterinarian who is approved by the Chief Veterinary Inspector for that purpose.

Name.	Address.	Number in Herd.
Ballarat Orphanage ..	Ballarat	135
Banyule Stud Pty. Ltd. ..	Wangaratta	31
Black, I. S., Estate ..	Mount Noorat ..	53
Clarke, A. B.	Glenormiston South ..	15
Dennis, Mrs. A. A. ..	Frankston	42
Dookie Agricultural College	Dookie	85
Dunbar and Clark, Messrs.	"Hazeldean Dairy," Mount Dandenong	18
Geelong Grammar School	Corio	68
Gibson, Mrs. C. S. ..	"Sweeney's," Eltham ..	35
Gorman, A. W. ..	"Cathcart," Alexandra ..	57
Henry, J. A.	Warrnambool	41
Holloway R. W. ..	Caldermeade	75
Mrs. G. Howlett and Miss E. Samuel	Lang Lang	55
Jakobi, L. W.	"Granada," Yannathan ..	80
Kilmany Park Farm Home for Boys	Sale	104
Lawrence, P. H. ..	"Rainga," Tarrawarra ..	67
Longerenong Agricultural College	Dooen	43
McNabb and Son, G. A. ..	Irrewillipe East ..	154
Nancarrow Bros. ..	Kerang	52
Northcote Children's Farm	Bacchus Marsh ..	156
Onley, W. H.	"Glenholme," Caldermeade	64
Parker, Mrs. L. M. ..	Tallarook	56
Payne, A. E. T. ..	"Yarra View," Lilydale ..	63
Payne, T. E. N. ..	"Woodburn," Kilmore ..	46
Poole, M. A. and D. ..	Caldermeade	134
Poole, M. A. and D. ..	Yannathan	72
Powell, T. S.	"Carellen," Mansfield ..	46
Richardson Bros., Messrs.	"Faldinghurst," Upper Beaconsfield	30
School of Horticulture ..	Burnley	6
State Experiment Farm ..	Ruthergien	37
State Research Farm ..	Werribee	229
Stephens, Dr. F. ..	Vermont	32
Tanner, N. J.	Pakenham	33
Vagg, T. E.	Officedale	45
Wells, W. G.	Caldermeade ..	65

In addition to the above-mentioned herds there are 372 commercial dairy herds containing 12,643 head of cattle which may be considered free of tuberculosis. All these herds have given negative reactions to two or more successive tests conducted by departmental veterinary officers, but inasmuch as replacement cows are only submitted to one test before being admitted to the herds, they cannot be considered as accredited under the accreditation scheme which requires among other things, that no cow shall be admitted to the herds unless it has given (2) negative reactions at an interval of 60 days, and must be kept in isolation during the period between the two tests.

There are also 708 herds in which 13,992 head of cattle have passed one test, and may be considered, therefore, to be in process of becoming tubercle-free herds.

Certified Pullorum Tested Flocks

A certified Pullorum Tested Flock is one in which all the breeding stock have given a negative reaction to the agglutination test for pullorum disease, and in which all such stock are kept under rigid conditions of isolation approved by the Chief Veterinary Inspector.

The undermentioned flocks have been certified by the Department of Agriculture, and will remain so until the next breeding season or until such time as the Chief Veterinary Inspector determines.

Full particulars of this scheme appeared in the February, 1942, issue of the *Journal of Agriculture*.

Application forms are obtainable from the Chief Veterinary Inspector, Department of Agriculture, Melbourne, C.2.

Owner.	Number of Birds.
Moller, F. C., Warburton-road, Lilydale	48
Robbins, R. B., Derby	83

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Issued by direction of the Hon. N. A. Martin, M.L.A., Minister of Agriculture.

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The Journal is issued monthly. The subscription, which is payable in advance and includes postage, is 3s. per annum for the Commonwealth and New Zealand, and 5s. for the United Kingdom and Foreign Countries. Single copy, Threepence. Subscriptions should be forwarded to the Director of Agriculture, Melbourne, C.2.

POSTAGE RATES

The postage required for this issue is:—To Australia and New Zealand, 1½d.; to United Kingdom, 2½d.; to United Kingdon via All-sea Route, 1½d.; to other British Possessions, 2½d.; to U.S.A. and Foreign Countries, 3½d.

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Wheat Variety and Manurial Trials—Salisbury and Kaniva

By ROY CROOK, Field Officer.

Experimental plots on the property of Mr. E. W. Dahlenburg, "Ellerslie," Salisbury, 1943.

FOR many years, trials have been conducted by the Department of Agriculture on both the black self-mulching loams and the stiff clay soils throughout the Wimmera.

Many wheat varieties and new crossbreds have been tested, resulting in the production of new wheats, various fertilizers and rates of sowing have been compared, and cultivation trials have demonstrated the efficiency and practicability of different methods. The information thus gained has proved beneficial to the farmer and the State, and has been the technical foundation of the high standard of farming practised.

Outstanding features of the trials recently carried out by the Department in this part of Victoria include the discovery of the value of zinc sulphate used in conjunction with superphosphate as a means of increasing crop yields, in some cases to the extent of several bushels an acre.

At one time Federation was the most extensively grown variety in the Wimmera, but was superseded by Free Gallipoli, which in turn was replaced by Ghurka.

The last-named wheat has been the most popular wheat in the Wimmera (as well as over the whole State) for some years, and is noted for its consistency in yield and excellent harvesting features, but in recent years, as the table hereunder indicates, it has been outyielded by several of the newer crossbreds and selections, and some farmers are expecting it to give place to one of these varieties or something even better than the plant breeder has already produced.

In the past season in the western Wimmera, higher yields than anticipated were due to autumn-like weather conditions during the ripening period. With fair winter rains, the plant was able to utilize all available moisture to the full extent and mature gradually. Yields of over 12 bags per acre were common, and in one instance a yield of 18 bags per acre was recorded. Results such as these indicate the high standard of cultural methods and management used by the individuals concerned.

Generally speaking, wheat crops throughout the western Wimmera were free from disease. A few isolated cases of Bunt, Flag, and Loose smut were the exception; sheep weed and wild oats were present in some crops.

Effect of zinc sulphate on wheat crop at Nhill.
Left, super. only. Right, super. + zinc sulphate.

The results of the wheat variety trials conducted in 1943 in the western Wimmera on the farms of Mr. E. W. Dahlenburg (Salisbury) and Messrs. Crouch Bros. (Kaniva) are given below :—

WHEAT VARIETY TRIALS IN THE WEST WIMMERA.
Yields in bushels per acre.

Variety.	Salisbury.		Kaniva.	
	1943.	Average 3 Years, 1941–43.	1943.	Average 3 Years, 1941–43.
Magnet ..	47·5	44·8	58·0	49·7
Pindar Selection 603	47·4	46·5	54·6	..
Quadrat ..	43·7	43·3	52·2	48·2
Wannon x Ghurka	49·6	43·1	49:5	46·1
Ghurka ..	44·4	42·3	47·8	44·2
Ghurka x White Fife	43·9	39·8	47·3	46·5
Ghurka x C.M.G. 5537.. ..	43·7	43·7	45·5	..
Pindar.. ..	43·5	43·4	50·4	..
Baldmin ..	45·9	39·7	..	..
Ghurka x C.M.G. 15 x ..	46·3	..	52·8	..
Ghurka x Ranee 6173.. ..	44·2	..	37·4	..

Note.—The yields per acre quoted in this statement are those actually harvested from the plots. Such yields are considerably higher (up to 20 per cent.) than would be the case if it were not necessary to have paths between the plots.

The outstanding new productions are Pindar Selection 603, Wannon x Ghurka, and Ghurka x White Fife. All of these varieties are of satisfactory milling and baking quality, particularly Ghurka x White Fife, which is outstanding in this respect. It is necessary, however, that a variety be tested over a period of years in several centres before definite conclusions are drawn regarding its prolificacy and disease resistance.

TRIALS WITH ZINC SULPHATE AT KANIVA.
Average yields in bushels per acre.

Treatment.	Three Years, 1940–42.	Two Years, 1940 and 1941.
No Manure	35·2	31·4
Super. 1 cwt. per acre ..	40·2	36·4
Super. 1 cwt. + Zinc Sulphate 1 lb. per acre	..	40·4
Super. 1 cwt. + Zinc Sulphate 5 lb. per acre	44·7	42·0
Super. 1 cwt. + Zinc Sulphate 10 lb. per acre	44·7	43·1
Super. 1 cwt. + Zinc Sulphate 20 lb. per acre	..	42·2
Super. 1 cwt. + Zinc Sulphate 56 lb. per acre	..	42·8

The remarkable results achieved on black land at Kaniva by the use of zinc sulphate in conjunction with superphosphate are shown in the above table. The use of even 1 lb. of zinc sulphate per acre has given an appreciable increase in yield, and 5 lb. per acre is definitely profitable to use. Zinc sulphate may be difficult to obtain this year, although another zinc compound known as zinc residue has given good results in experiments.

ORCHARD DRAINAGE

By G. W. Gayford, B.Agr.Sc., Horticultural Instructor

The past season has been abnormally dry and, except where water was available, trees in many parts of Southern Victoria have not produced fruit of satisfactory size. Under such conditions, it is probable that growers' thoughts are far from the subject of excessive water. It is a peculiar fact, however, that a comparatively dry season usually results in trees making very healthy growth, and, provided the dryness is not prolonged, as in the past season, the crop is not adversely affected.

A DRY winter and spring usually cause growers to remark that their trees are looking particularly well. The reasons for this are several, and include the absence of insect pests such as green peach aphids, and fungous diseases such as black spot of apples and pears, and brown rot and shot hole of stone fruits, all of which are favoured by a wet winter and spring. The chief reason for the healthy condition of the trees, however, is the absence of excess water in the root zone. For good root growth the amount of moisture in the root zone should be not less than the wilting point and not greater than the water-holding capacity of the soil. In a very wet season, the root zone is saturated, and unless the water can be drained away new growth is prevented, and eventually the tree is affected. The extent to which a tree is harmed depends upon the period for which the root zone is saturated. When trees are dormant they are not susceptible to water injury, but if the soil is waterlogged for a length of time in the early spring, damage will occur.

Various kinds of fruit trees are affected in different degrees. The order of susceptibility is as follows:—

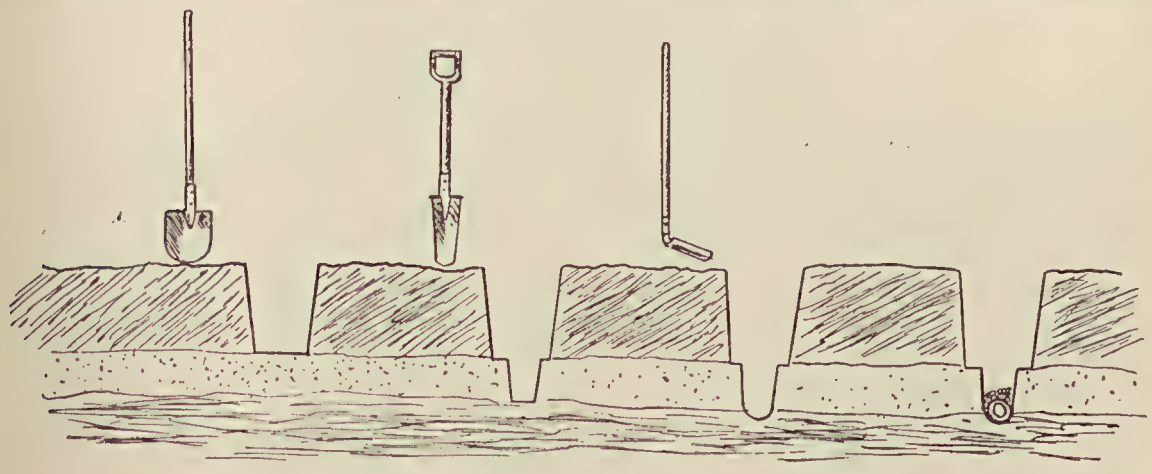
Very susceptible.—Peaches, apricots, citrus, cherries.

Moderately susceptible.—Apples, pears, plums.

Resistant.—Quinces, figs.

The susceptibility of the various kinds of fruit trees should be borne in mind in planting out a new orchard of mixed varieties, so that the most susceptible varieties are given the best drained location.

All fruit trees thrive under well-drained soil conditions. However, ideal conditions are rare in Victoria. The Bacchus Marsh district, for



Steps in drainage—The long-handled shovel for opening up trench; narrow-mouthed spade to deepen the trench; Scoop to round out and level the trench bed; tile placed in position with a layer of gravel on top.

instance, is one of the few possessing a fruit-growing soil in which moisture does not accumulate, because of the great depth of permeable alluvium. Generally speaking, most of the soils on which fruit trees are grown are subject to waterlogging, and this brings up the question of how best to remove the surplus water. Under all but very wet conditions, this can be done satisfactorily by means of surface drainage, sub-surface drains, and growing cover crops in winter.

Large volumes of water may be removed from orchards by surface drains, provided there is sufficient slope to carry it away. Where the orchard is ploughed in the autumn, the usual practice is to plough on to the trees, thus leaving the centre of each land at a lower level than that near the trees. If ploughing is not carried out, a single furrow ploughed down the centre of each land would serve the same purpose.

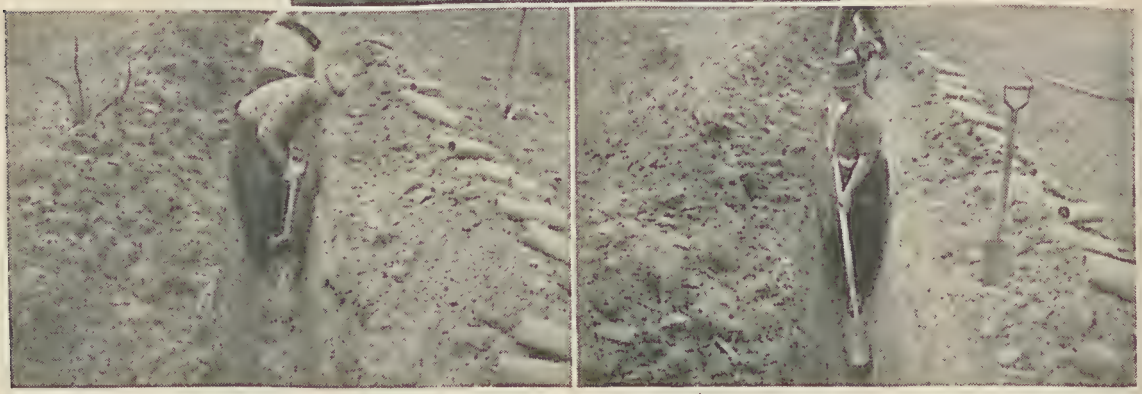
Drains running long distances down the centre of each land are likely to scour, especially if the slope is steep. This may be prevented by limiting the length of the run according to slope by constructing ditches at right angles to the drains. Cross ditches must have sufficient down fall to carry away water without overflowing and should not be neglected during the winter, otherwise they may become choked with weeds.

Green crops planted in the autumn remove large quantities of moisture by transpiration. Tick beans, dun peas, and lupins are particularly efficient in this regard. If, through any reason, it is not possible to plant a green crop, the natural weed cover which grows in the winter would serve a similar purpose, although it is not as efficient. In heavy soils, which are not suited to underground drainage, the growing of a bulky green crop is the best method of lowering the water table.

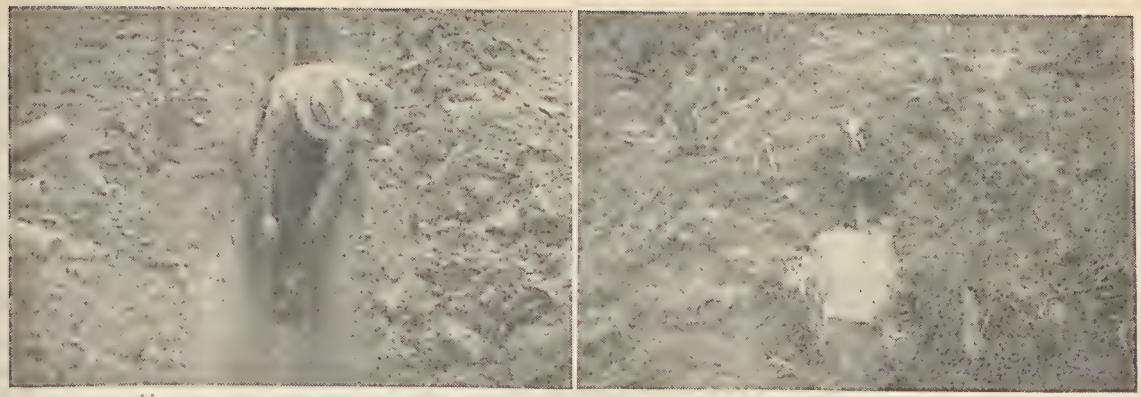
Tile drainage is the most satisfactory method of removing surplus moisture in the soil. The greatest cost of installation is labour, and it is probable that this factor may prevent growers from carrying out drainage schemes at the present time. However, as there is usually some time available for this type of work in the winter, growers should adopt the policy of laying down a few drains each year, particularly in the "wet" patches of the orchard.

Drains are not of much use in deep sandy soils, except where the water table has risen under irrigation, or in very heavy clays. It is the intermediate type of soil which is most benefited, i.e., a permeable surface soil overlying a clay subsoil. This is typical of a large area of orchard land throughout the State.

Under irrigated conditions in the Murray Valley, free water may rise in the soil and cause waterlogging, or bring a high concentration of salt within the root zone of the tree or vine. Underground drainage has proved effective in reducing the water level where the soil is reasonably permeable, but where the soil type is very heavy underground drains are ineffective.



Top—Opening the trench with a long-handled shovel; Left—Deepening the trench with the narrow-mouthed spade; Right—Levelling and rounding out the trench bed with a scoop.



Left: Laying the tiles in position. Right: A clear outfall is essential for the drain.

Under favourable soil conditions, drains are frequently laid to a depth of 4 to 6 feet, depending on the soil type. Where the drains are laid at less than 4 feet the distance apart should be not more than 30 feet. For drains laid at a greater depth, the distance apart may be increased. Drains 7 feet deep should be spaced 80 to 90 feet apart. In southern districts every land should be drained, and the tiles should be laid with a sufficient gradient to allow water to run freely to the outfall.

The usual procedure in digging a trench is first to open up a ditch with a long-handled spade or shovel. This can be dug to a convenient depth, depending on the soil type; the bottom should be about 6 to 8 inches above the impervious layer. The final opening up to the required depth should be done with a narrow-mouthed spade or "graft." The bottom of the trench is then hollowed out and levelled by means of a long-handled scoop-like implement. It is essential that the bottom of the trench should be level, so that tiles can be put together with no gaps between them. This prevents the entry of silt or roots from trees or weeds, which are the common causes of blockage. Any variation in the grade along a line of tiles will cause a variation in the speed of water passing through, and water which slows up drops some of the suspended matter, thus causing deposits of silt to accumulate. A slight increase in fall along the length of the drain would not be a disadvantage, but decreases should be avoided. When the ditch has been completed the level should be tested by taking three sticks of equal length with cross pieces of wood nailed to the top, placing one at each end in a vertical position, and moving the other down the length of the drain. By sighting along the cross pieces from one end any variation in level can be noted by either a dropping or rising of the central stick, and the depth of the drain should be altered accordingly.

The diameter of the tiles for most purposes should be 3 inches, although for short runs 2-in. tiles would be large enough. After the tiles have been laid, a covering of 2 to 3 inches of some loose material such as clinker, coke, coarse gravel, brush or straw should be laid on top. This will assist in preventing the entry of silt into the drain.

The minor drains are either connected to a main drain of larger diameter or open directly into an open ditch. Although the open ditch allows inspections of the outfalls to be made regularly and thus any stoppage can be quickly remedied, some time must be spent each year in maintenance and weed control, otherwise the ditch will become choked with rubbish. If the country is at all steep, open ditches have a tendency to scour, in which case a main underground intercepting drain would be more suitable. The main drain should have sufficient gradient to allow water to pass quickly along it. The outfall should be free from danger of flooding from other sources such as an adjacent creek.

Well carried out, underground drainage should add materially to the health and productivity of an orchard.

SUPPORT THE FIRST VICTORY LOAN

Urinary Calculi in Sheep

By Veterinary Officers of the Live Stock Division

UNDER certain conditions mineral deposits varying in size from fine sand to masses as large as a pea may be found in the urinary tract of sheep. These deposits are known as urinary calculi, and may occur in the kidney, in the bladder or in the urethra —the passage which carries urine from the bladder to the exterior.

In general, the presence of calculi in the kidneys or bladder may be unaccompanied by ill effects, but sickness and death may follow when the flow of urine is partially or completely obstructed. This usually occurs when calculi in the bladder pass into the urethra. In ewes, the urethra is short and is more readily dilated, and in consequence obstruction of the urethra, accompanied by a suppression of urinary flow, is seldom seen. In rams and wethers, on the other hand, the urethra is a relatively slender tube, and calculi are likely to be impacted at two places, (1) at the pelvic flexure, where the penis forms an S-shaped bend between the hind legs, and (2) at the "worm" or urethral process at the end of the penis.

For these reasons, trouble arising from urinary calculi is more frequently observed in male animals. Partial obstruction of the urinary flow may cause signs of uneasiness, and if not relieved, toxic symptoms develop, due to the interference with the excretion of waste products. When the obstruction is complete, or nearly so, the bladder ruptures and death soon follows.

The symptons of urinary calculus are fairly characteristic, and straining to pass urine is an early sign. This is accompanied by a wiggling of the root of the tail, and kicking at the belly. At first the sheep stands with its back arched, and may stamp its hind feet, and in the later stages is usually found lying down. As the urine accumulates in the bladder, the belly becomes greatly distended, the animal becomes dull and mopey, and unless relief is obtained death ensues.

On post-mortem examination, the belly cavity is found to contain a large quantity of urine which has escaped from the bladder after the rupture has occurred. Usually a tear in the bladder wall can be readily found, but in some cases the bladder has contracted and the breach in the wall may be difficult to find. A search of the urethra will reveal one or more calculi blocking the passage, the commonest site being along or just behind the urethral process at the end of the penis. Other calculi may be found in the bladder, although with the rupture, these may be discharged with the urine into the abdominal cavity. Stones and gravel may also be found in the kidneys.

The treatment of affected animals is generally unsatisfactory. Sometimes gravel or small stones may be worked along the penis to the exterior by gentle manipulation, and when the obstruction is present in the urethral process or "worm," this structure may be cut off, thus allowing the urine to escape. Usually, however, calculi do not occur singly, and more stones may be passed out of the bladder to cause an obstruction higher up in the urethra.

The chemical composition of calculi varies considerably, although calcium carbonate and calcium oxalate are two mineral salts commonly present.

The reasons for the formation of calculi in the urinary tract are obscure, although diet appears to play some part. Calculus formation can be provoked in rats by feeding them on a diet deficient in vitamin A. Dry pasture is deficient in this vitamin, and the frequency with which urinary calculi are found in sheep which have been through a long dry period without green feed lends some support to the view that a deficiency of vitamin A may play a part in the origin of this condition in sheep. In this connexion it might be pointed out that the only supplementary grain rich in vitamin A is yellow maize.

Secondly, it has been suggested that highly mineralized or salty drinking water may provide the minerals which, in excess, may lead to calculus formation. Experience in Victoria, however, has not confirmed this hypothesis, although a combination of saline drinking water and vitamin A deprivation may increase the susceptibility of sheep to urinary calculi.

The trouble appears to be more common among male sheep in red soil districts, and numerous cases are reported each year from certain areas in the north-western portion of the State.

RYECORN—

A Cereal for Winter Grazing and Drift Control in the Mallee

By H. J. SIMS, M.Agr.Sc., Dip. Com., Manager Mallee Research Station, Walpeup

IN the Mallee, large areas of cereals, particularly oats, are sown annually for winter grazing for sheep. Soon after the establishment of the Mallee Research Station in 1932, experiments to obtain yield comparisons of various oat varieties were commenced (6). In addition, other cereals were included in the trials. Ryecorn, a cereal then comparatively new to Mallee farmers, was first tested as a grazing possibility at Walpeup in 1936. Since that time its value for this purpose has been proved, and also its value in erosion control confirmed. Its usefulness for the last-mentioned purpose has been realized by several competitors in the Mallee Sand Drift Control Competition (2, 3, 4).

Ryecorn (*Secale cereale*) is a native of Europe and Asia, where it is widely cultivated, especially in the northern areas, for its grain, from which black bread is made, and for its straw, which is used for thatching purposes, paper making, and for straw hats. In the British Isles, it is grown mainly for green fodder. Ryecorn, in Europe, is grown under conditions too cold for wheat, and also on land too sandy or too saline for other cereals. Black bread is the staple cereal food in many of the northern European countries, but is generally regarded as being inferior to wheaten bread.

Ryecorn occupies only a minor place in Victorian agriculture, and in the past has been used mainly for green fodder purposes. Between 1920 and 1939, the area sown to this crop has been in the vicinity of 1,000 acres, but in the last few years the acreage has increased to several times that amount. This increase is due to its use in the Mallee, mainly for drift-control purposes, but it also has possibilities as a cereal for winter grazing in that area. Rye, however, is not a satisfactory cereal for cutting for hay. It is too coarse, and has a strong beard or awn on the head. Further, it does not give satisfactory grain yields. It is not normally a self-pollinated plant and, under dry conditions, pollen may be desiccated before reaching the stigma of another plant. Under these conditions, the quantity of seed set is rather low and therefore grain yields are disappointing.

There is a tendency among some Mallee farmers to confuse ryecorn and ryegrass. Ryecorn is a cereal with a large grain nearly as large as a wheat grain but dark in colour; whereas ryegrass is a pasture grass and has a small light seed. Wimmera ryegrass is sown for grazing in many localities in the Mallee.

Ryecorn for Grazing

Tests have been carried out at Walpeup to compare the value of various cereals for grazing. It must be realized that these comparisons are between varieties of cereals, and that there can be differences just as big between different varieties of one cereal as there are between the different cereals. Rye has given higher yields of green feed than any other cereal tested. Of the two varieties of rye tried, the more prostrate Black Winter variety has given more total green feed than the more upright South Australian strain, but the latter gives more early growth and feed. The yields of green stuff, adjusted to an 80 per cent. moisture basis are set out in Table 1 on the following page.

Dawn oats were chosen as the oat variety in this trial, because in previous trials (6) they had yielded 10 per cent. more green feed throughout the year than the standard variety, Algerian.

With green fodder, palatability of the crop is important. In most years, no differences in palatability are evident between any of the cereals at early grazings, but at late grazings, rye, which commences upright growth comparatively early, is definitely unpalatable, it being coarse and stemmy.. At this stage, sheep

Comparison of growth of ryecorn and oats on a sand-hill, Walpeup. Left, Ryecorn; right, Dawn Oats, November, 1943.

will neglect this cereal in favour of any other. As stated above, usually, at the July grazing, no differences in palatability can be detected, but in 1943, at this grazing, an outstanding preference was shown for ryecorn. The plots of this cereal were eaten to the ground within 24 hours of the time the sheep were put in, while they remained three days longer to graze out the oats.

With regard to the nutritive value of rye, in comparison with other cereals, analyses of several cereals were carried out by the Agricultural Research Chemist in 1936. Results are shown on Table 2.

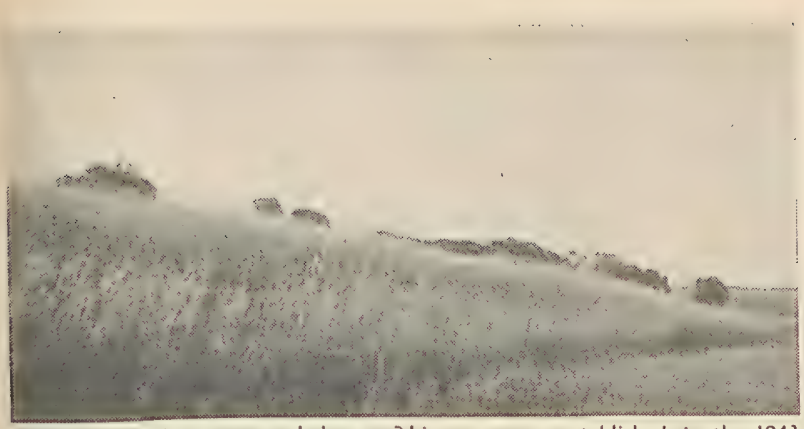
Table 2.—Chemical Analysis of Cereals at Grazing Stage, July, 1936 (Dry Basis).

—	Black Winter Rye.	Cape Barley.	Mulga Oats.
	%	%	%
Ash	25·71	22·09	15·00
Silica	13·58	7·82	4·05
Silica free ash ..	12·13	14·27	10·95
Protein (N.x 6·25) ..	25·42	22·76	22·82
Crude fibre.. ..	20·13	17·57	21·70
Nitrogen-free extract + fat	28.74	37.58	40·48

Table 1.—Cereal Grazing Trials, Walpeup.

Yield in cwt. per acre. 80 per cent. moisture.

Variety.	First Grazing, Mid July.	Second Grazing, Early Sept.	Third Grazing, Late Oct.	Total, all Grazings.
Average Five Years, 1937–41.				
Black Winter Rye	10·7	11·9	13·1	35·7
Dawn Oats	9·6	9·6	10·0	29·2
Cape Barley	6·3	9·2	12·9	28·4
Ranee 4H Wheat	6·9	8·5	11·1	26·5
Average Four Years, 1938–41.				
Black Winter Rye	11·0	13·8	18·5	43·3
South Australian Rye	12·4	11·6	18·2	42·2
Cape Barley	7·9	10·9	18·4	37·2
Dawn Oats	10·0	11·6	14·3	35·9
Ranee 4H Wheat	8·5	9·9	15·9	34·3
Average Four Years, 1939–41 and 1943.				
South Australian Rye	11·7	10·0	15·2	35·9
Dawn Oats	9·2	10·2	12·4	31·8



Ryecorn growing on a sand dune. This cover was established in the 1943 drought. The seed was broadcast in August and covered with a light cultivator.

The high ash content of Black Winter Rye and Cape Barley was partly due to sand adhering to the leaves. This is shown by the silica analysis. Black Winter has a higher protein percentage than the others, and the fibre content also is high.

Ryecorn for fodder should be regarded as purely a grazing proposition. If a crop is to be allowed to recover for grain, oats are to be preferred, as oats provide a much more useful grain than rye. Rye grain has a peculiar smell and taste. It is definitely not palatable to stock, and can be used only when mixed with other grains.

Ryecorn for Drift Control

It is in regard to drift control that ryecorn is a most useful crop. Of all the cereals which are grown at present, rye withstands the onslaughts of the sand blast the best. On poor blown hills, where wheat and oats grow only a few inches high, or are completely blown out, rye has been observed to grow vigorously and may attain a height of 3 to 4 feet. On banks of loose sand, blown from fallow paddocks, ryecorn has been sown, and has flourished, and prevented this sand from moving forward and damaging services, such as roads, railways and channels. The cost of channel maintenance in the Mallee is large, and averages in the vicinity of £100,000 per year. To try to minimize this expenditure, the State Rivers and Water Supply Commission has, during the last three years, spent £10,000 on resuming land adjacent to its channels and from which a large amount of sand has drifted into the channels every year. These places were fenced and planted with ryecorn, which has proved a wonderful protection to the channels—the annual saving in the cost of removing drift being equal to a return of 27 per cent. on the capital (3).

Early in 1943, a questionnaire was sent to all people who received ryecorn from the Mallee Research Station in 1942 (1). Nearly 50 questionnaires were returned, and more than half the farmers who replied actually had grown rye and other cereals under similar conditions. Only one of these considered other cereals had made better growth than rye; but this one instance was not sown on ground very liable to drift.

The use of a cover crop on fallows is a practice now being used to some extent throughout the Mallee. This Station has advocated oats for the purpose. Oats have been known to be a satisfactory crop to use in a wheat-growing rotation, and the seed is readily available. Actually tests have now been made at Walpeup with cover crops of the various cereals, and the results are given in Table 3. There has been a greater yield depression with

A photograph of the sand hill above taken in 1941.

rye than oats. Oats as a cover crop have depressed the yield of wheat less than wheat and rye, barley causing the greatest reduction.

Table 3.—Yield of Wheat Following Different Cover Crops.

Average Yield 3 Years, 1940-42 bus./ac.
Wheat Yield Following:—

Bare fallow	16.6
Cover crops of oats	15.3
Cover crop of rye	14.9
Cover crop of wheat	14.9
Cover crop of barley	14.5

Another objection to a rye cover crop is the fact that it is hard to control the grazing to prevent seeding, and self-sown rye appears in the subsequent wheat crop. As rye is taller than wheat this contamination looks particularly bad. However, owing to the fact that rye requires cross-pollination, these isolated plants, although they do set seed, produce only a small number of grains per head. To ascertain the reaction of buyers to this contamination, a sample of wheat was "doctored" with rye, and contained approximately 14 per cent. ryecorn. This sample was submitted to the Australian Wheat Board, which reported "that in the event of this wheat being delivered to the Board, a dockage of 1½d. per bushel would have to be imposed on account of the heavy percentage of rye contained in the wheat. It is pointed out that although rye is a good feed, buyers will not pay the f.a.q. price for wheat if there is any foreign grain in it."

It will therefore be seen that the amount of the dockage was not unduly heavy, considering the large percentage of rye present. Contamination with rye was much greater than would be expected under natural conditions. However, it is maintained that oats should be used as the cover crop to eliminate this risk of contamination and dockage.

The place where rye is outstanding is in the reclamation of semi-abandoned areas on loose sandhills, or on areas of drifting sand. Although the plant is frail for the first few weeks—in fact, the growth at this stage looks less attractive than the other cereals—it soon makes vigorous growth and withstands severe sand blasting. Of course, it cannot do the impossible and make satisfactory cover on sandhills in a drought, as last year. The tops and bare portions of many hills that do not grow any crop at present, could, with advantage, be sown to ryecorn and not harvested. The straw will hold the hill from blowing, if it is not over-grazed, and the ryecorn will come up as a self-sown crop the next year.

Probably more drifting has occurred on sandhills because of injudicious and over-grazing than from cultivation, and it is imperative, when hills are being reclaimed, that grazing be strictly controlled. In some parts of South Australia, no attempt is made to harvest the sandhills. They are sown with ryecorn, allowed to seed, and then used for grazing with the rest of the paddock.

Varieties of Rye

As rye is a cross-pollinated plant, varieties will not breed true, as do wheat and oats. Because of this, and because of the fact that it has occupied such a small place in Australian agriculture, little work concerning rye varieties has been undertaken in this country. The common southern Victorian variety is Black Winter, and this has been used mainly for green fodder. Other varieties are—Emerald which is suitable for late fodder, and White, a variety especially suited for horse collar making. Slav is a comparatively new variety which has shown promise in New South Wales. A variety much earlier than any of the above, and with quicker early growth, is grown in South Australia and now in the Victorian Mallee. Despite the fact that many inquiries have been made, the varietal name of this has not been definitely ascertained. It appears to be a variety produced by natural selection in the district over a long period, and is thus well suited to Mallee conditions, particularly for use for sowing for the reclamation of sandy areas.

The most important disease of rye is Ergot (*Claviceps purpurea*); but this has not been noticed in the Mallee. Owing to the medicinal properties contained in ergot, and the difficulty of its importation at present, rye is now being grown in the southern districts, and artificially inoculated to produce a "crop" of ergot.

Summary

Ryecorn has a smaller grain than wheat, and can be sown at a lighter rate per acre than other cereals, 30-50 lb. per acre should be an adequate seeding.

Being cross-fertilized, the seed set of ryecorn is not satisfactory, and grain yields are disappointing.

[*continued on page* 162

BOTULISM IN STOCK

By Veterinary Officers of the Live Stock Division

Nature and Cause

BOTULISM is a food poisoning caused by animals eating fodder containing the toxin or poison produced by a microbe (*Clostridium botulinum*), which grows and multiplies in decomposing fodder, or in the carcasses and bones of animals and birds. The microbes attack dead tissue only, and it is the poison produced in this dead tissue, that, if ingested with the food, produces the disease. Botulism is not infectious nor contagious, it is not transferred from one live animal to another, nor is it necessary for the germs to enter the living animal. The toxin, which is soluble in water, is one of the most powerful poisons known. In common with other bacterial poisons it produces its effects only after a definite interval, which is from three to seven days.

When growth and multiplication of the organism ceases because of lack of certain essential conditions, spores are formed. These spores are very resistant to outside influences, and will retain their vitality even when dry, and then they may be carried about in dust or other dry material.

Conditions for Growth.

As mentioned previously, the organisms live in decomposing animal or vegetable material. Warmth, moisture and an absence of oxygen (or air) are essential for their growth and multiplication.

The fact that an absence of oxygen is necessary for growth probably prevents the disease from being more common. It is found, however, that the microbes can grow in decaying material exposed to air, provided moulds are present. Moulds grow on the surface of material, but immediately beneath the mould, the oxygen of the atmosphere is used up and thus conditions are made suitable for the multiplication of the causal organism. At one time it was thought the disease was attributable to the moulds, but whereas mouldy fodder itself may produce slight digestive disturbance it will not produce the disease we now term botulism.

Sources of Causal Organism

Sources of the causal organism and its toxin are as follows:—

(1) Hay, chaff, or grain damaged by water, and probably mouldy.
(2) Fodder contaminated by mice.
(3) Fodder in mangers contaminated by dust or water percolating from old straw-covered stables.
(4) Old grass paddocks of a tussocky nature, or long stubble trampled into a mat.
(5) Butts of stacks; cocky chaff left in paddocks after harvesting.
(6) Decomposing manure or manure-contaminated fodder.
(7) Water polluted by stable drainage.
(8) Bones and decomposing carcasses.

The disease has a seasonal incidence, mainly because fodder is most likely to be damaged by the warm summer and autumn rains during harvesting and storing operations. Mouse plagues also take place in the autumn.

The nests of mice and the bodies of dead mice in fodder form ideal conditions of warmth and moisture for the growth of moulds and other organisms, and if the *Clostridium botulinum* be present the production of toxin will result. These facts explain why the disease is more prevalent in plague years, when it is a difficult matter to protect hay, chaff, and grain from contamination by mice. In times of drought also, numbers of cases occur, for, consequent on scarcity of good fodder, damaged hay and grain are used for feeding stock.

It is possible also that mice may carry the germs from the soil into chaff or hay, and there the germs may grow and multiply in and around the mouse nest and produce the toxin. Further, the mice may carry minute pieces of decaying vegetation impregnated with the poison into clean, sound fodder.

Many cases investigated in northern Victoria have been traced to old straw-covered stables, particularly where the mangers are situated in such a way that summer and autumn rains can percolate through the straw and drop into the

feed. These old straw roofs form good conditions for vegetable decay, as well as harbours for mice and birds. They act as stores for the bacterial poison which, being soluble in water, is readily carried through by rain.

Pasture Infection.

It is interesting to note that outbreaks of botulism have been reported where animals were not hand-fed, and had no access to decaying vegetable refuse around stacks, &c. As a result of investigation, it has been found that the poisonous fodder consisted of dead and decaying grass found at the base of tussocks and tufted grasses. Mouldiness is often seen around the bases of such tussocks, and this is a condition suitable for the development of the poison. Other material in the field in which the causal organisms will thrive is cocky chaff from winnowing during harvesting or threshing operations; this material, if damaged by rain, will decay and may become infected.

Manure of any animal is of course decomposing material, and as it is moist and warm, forms a suitable medium for the production of toxin of the causal organism of botulism. Cases of the disease have been traced to the eating of fodder contaminated by poultry manure, while it is not uncommon for animals to have a depraved appetite, in which case they will actually eat dung.

Other outbreaks have been traced to pollution of the water supply. One very striking instance of this was brought under the notice of the Department by a private veterinarian. Two horses died from botulism some few days after having been allowed to water from a surface dam into which drainage from the stable and stable yard found its way. No other likely source of the poison was discovered. On inquiry it was found that some seven or eight years previously horses had died from botulism on this property, and the officer investigating had instructed the owner to fence off this dam. This was done and no further cases occurred until, through failure of a windmill, the horses were allowed access to the water close to the stable.

Owing to the solubility of the toxin, it may be washed from the part where it was produced to an apparently clean portion of the fodder, and further, owing to the interval of time between the eating of the fodder and the development of symptoms, it is often difficult to obtain a sample of the poison-contaminated fodder.

BOTULISM IN HORSES

The symptoms of botulism vary somewhat but in general they are marked by paralysis of the various muscles. The animal becomes dull and listless and there are irregularities in its gait; it may knuckle over and stumble as it moves along. The eye is noticeably dull and the eyelids are often partially closed, and the head appears to be "heavy". In many cases there is interference with the functions of eating and mastication, strings of saliva and wisps of fodder may be seen hanging from the mouth.

Later the paralysis of the various muscles increases, and the animal becomes prostrate, often showing a paddling movement of the limbs while in such position. Acute cases sink into a semi-comatose condition, and death takes place in a few hours. In those cases in which the patient eats and drinks, the disease will run a chronic course over a period up to several weeks if slinging be carried out. Even then, however, a favorable prognosis can rarely be given.

Because many animals have access to the poisonous forage at the same time, it is usual for more than one animal to be affected, but the disease is not transferred from one live animal to another.

Colt showing signs of irregular gait due to botulism.
[After Seddon

Treatment

Botulism has a particularly high mortality rate, indeed, but few animals recover. Thus in the case of horses where single working animals are valuable, the actual monetary loss to any one farmer may easily run into hundreds of pounds, while the loss

from the shortage of working horses on a farm on which there are several cases is difficult to compute.

Where horses lapse into coma or unconsciousness, nothing can be done, and farmers with experience of the disease usually destroy the animal rather than allow it to linger as a hopeless case.

In those cases in which the horse is fairly bright, and eager to eat and drink, and makes a bid for life, it is recomended that it be placed in slings and nursed. A laxative diet easily eaten is indicated—green feed, small bran mashes, &c. It should be noted that slinging is quite useless unless the horse is able to stand after being raised to its feet, the sling being used to prevent its falling down.

Drenching should be avoided if possible, as often there is difficulty in swallowing. Warm soapy-water enemas may be given several times a day. Epsom salts, from two to four packets, may be dissolved in the water with which the mashes are made, and the following mixture may be given:—

Powdered	Potassium nitrate ..	1 oz.
„	Sodium salicylate ..	1 oz.
„	Red cinchona bark ..	1 oz.
„	Nux vomica	2 oz.
„	Ammonium carbonate..	4 oz.
„	Linseed meal . ..	3 oz.

These ingredients are mixed together. One ounce of the mixture is mixed with treacle and water and pasted on to the horse's tongue with a flat stick, each morning and evening.

Under the most favorable conditions, some few horses will make a recovery, but they must be kept in the trevis-like sling for many weeks. For the first two weeks at least it is inadvisable to take the patient out of the sling at all. By that time, if progress has been made, an experiment might be tried by leading the horse out for a very short walk. As it is being led out of the trevis one man should take hold of its tail while two others should support each hip. Twenty or 30 yards should be sufficient for the first day. If that exercise is satisfactory, a gradual increase is made in the daily walk, and after perhaps two weeks of this, or as progress suggests, the patient may be allowed free during the day, but placed in the sling at night until the owner is satisfied that the horse can rise without aid.

The type of sling that proves satisfactory is that constructed with four posts with a stout rail along each side, from which strong sacking

Wisps of fodder hanging from the mouth of an affected animal. Note dull and listless appearance. [After Seddon.

supported by straps or ropes can be used for the support of a horse. A breast-plate and breeching of rope completes the sling. This trevis, as it really is, if erected in an open type of shed, allows an arrangement whereby the horse can be conveniently led in and out without backing or turning sharply.

Control Measures

In discussing this disease, the old maxim which states that "prevention is better than cure," is particularly apt. If sound fodder only be used and if precautions are taken to prevent contamination by mice or with manure, botulism cases will be unlikely to occur, therefore, it is necessary to take every precaution to protect hay, chaff, and grain from damage by rain or by mice.

Poultry should be kept out of the stables and fodder barns, which latter should also be as nearly as possible mouse-proof.

All straw-roofed stables should be inspected. Those beyond repair should be pulled down. In all cases it would be advisable to line the roof immediately above the mangers with galvanized iron to prevent water and dust from falling.

Damaged hay—tops and bases of stacks—decomposing cocky chaff, and other like material should be burned, and manure should not be allowed to collect around the stable yard.

Care should be taken to ensure a pure water supply for all stock.

To correct the depraved appetite acquired by many country horses, a mineral supplement should be made available. With horses the mineral calcium (lime) is the essential one, being deficient in country districts in this State, and the following mixture is recommended for general use:—

Stock salt, 60 parts by weight.
Agricultural lime, 40 parts by weight.

This mixture may be placed in boxes in the stable yard, or may be placed in a small tray alongside each manger. In many cases, a change of diet has a beneficial effect on this depravity. Lucerne chaff or hay is excellent.

BOTULISM IN CATTLE

(*Impaction Paralysis*).

Bone Chewing.

A predisposing factor in the cause of botulism in cattle is the bone chewing habit, due in almost all cases to the cattle receiving rations deficient in some essential ingredients. Better and more liberal feeding and the provision of licks containing lime (calcium) and bone meal or flour (calcium phosphate), assist in preventing this habit. This deficiency is also the cause of cattle eating manure, particularly poultry manure.

Cow with botulism. Note the expression of the head, with protruding paralyzed tongue.

Symptoms

It is difficult to state what is the first symptom. Several stock-owners have stated that the first they have noticed is a stiffness in the action of the front legs, but it is probable that earlier than this there would be a difficulty in gathering food, together with a general lassitude and drowsiness. Slobbering at the mouth takes place, and sometimes there is a watery discharge from the nose. Rumination or chewing the cud ceases, the paralysed tongue may protrude from the mouth, and the stiffness in the gait increases to an unsteadiness in walking.

There is naturally a very evident falling away in condition, and this is emphasized by the flattening of the usually well-sprung posterior ribs. The breathing is shallow with no movement of the chest wall, but simply shows as a fluttering of the flank muscles.

Soon the beast can neither eat nor drink, or can drink only with difficulty, and finally it goes down, and is unable to rise.

The average case may linger from three to five days, but more acute cases occur, and with such, death may take place in a few hours. The symptoms in these acute cases would be sudden paralysis and coma.

The paralysis most commonly noticed is, of course, that of the muscles of the limbs, but it must be remembered that the muscles used in the acts of gathering food, of swallowing, of stomach and bowel movement, and of breathing are also affected in some degree.

Post-mortem Appearances

Post-mortem appearances vary according to the length of the illness. In acute cases, little abnormality will be noticed in the carcass, but if the beast has been drenched, some evidence of the drench having "gone the wrong way," may be seen by its presence, and perhaps even that of some food, in the wind-pipe and bronchial tubes.

In longer-standing cases in which a drench has not been swallowed correctly, there may be a definite pneumonia evidenced by a portion of the lung being solidified, and by the presence of a frothy septic discharge in the bronchial tubes.

In the average case there invariably is a large amount of food present in the paunch; if the beast had not been able to drink for some days, the condition of this food both in the paunch and in the bible is drier than normal, which condition was one of the factors by which the disease was earlier known as impaction paralysis. This so-called impaction is more correctly termed a stagnation of food, and is due to the paralysis of the muscles of the digestive canal. In many cases a piece of bone has been noticed among the paunch contents. Any decaying food that may have been the cause of death would very likely not be recognized even if still present. Often a bolus of food is seen in the back of the mouth, although it may be positively known that no food has been eaten for many hours, or even days.

In cases that have been drenched early in the illness, but which have died subsequently, the intestine, unlike the stomach compartments, contains very little ingesta.

Treatment

Frequently in cattle a lethal dose of the poison may be swallowed, but on account of the arrangement of the digestive system in ruminants, it is probable that the poison is distributed through the large amount of food held in the paunch, hence absorption of it all may not take place at once, and if it be possible to remove any unabsorbed poison, it is probable that the patient will recover.

It is advisable to administer a small quantity of water, and if this be swallowed, then proceed to treat with a purgative drench, such as—

Epsom salts—1 to 1½ lb.
Bicarbonate of soda—4 oz.
Treacle—½ lb.
Water—1 quart.

Every care should be taken, and the drench given slowly. If the patient be unable to swallow, a drench can be given only by artificial aids. There are two means of doing this, which are as follow—

(*a*) Stomach tube.
(*b*) Trocar and cannula.

(*a*) As an improvised tube 5 feet of ½-inch hose may be used. To insert, first construct a wooden gag to fit as a bit across the mouth; bore a hole in the centre large enough to take the tubing, and with the gag in place, and the cow's head and neck held straight, pass the tube through the hole in the gag, and over the back of the tongue into the gullet. After it enters the gullet it should be possible to feel it there with the hand, manipulating the left side of the neck just above the wind-pipe.

A length of approximately 4 ft. 6 in. of the hose should be inserted, a funnel attached and the drench poured in.

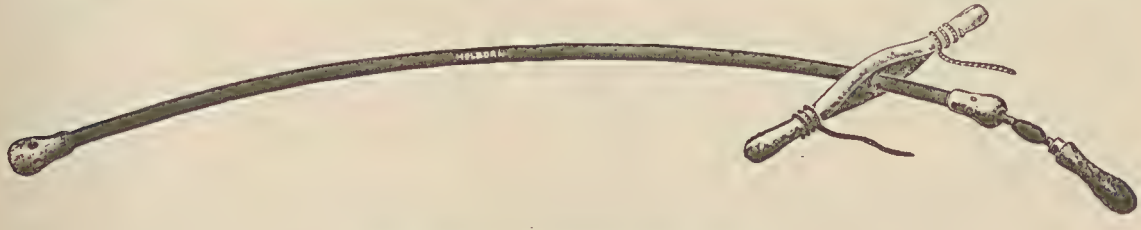
(*b*) A trocar and cannula is inserted into the rumen at the left flank at a point equidistant from the last rib, the point of the hip, and the edge of the loin bones. The trocar is then withdrawn, and the drench poured in through a funnel. Neither of these operations is as easily performed on the recumbent paralyzed beast as on one not so affected, therefore the services of a veterinarian should be obtained, where possible.

If there is no veterinarian in the district, the following further treatment may be given:—

Potassium nitrate	.. 1 oz.
Sodium salicylate	.. 1 oz.
Nux vomica	.. 3 oz.
Ammonium carbonate	.. 4 oz.
Linseed meal	.. 3 oz.

Mix and divide into twelve powders. One powder to be mixed with treacle just before use, and pasted into the mouth three times a day.

To sustain the patient, sloppy and liquid foods, such as gruels and milk, may be given as long as the animal is able to take them.



Cattle probang or stomach tube, with gag.

Prevention and Control

1. The most important factor in preventing the bone-chewing habit (and therefore, botulism), is in the provision of adequate and properly balanced food supplies throughout the year

2. All bones and portions of carcasses, including rabbits and birds, should be gathered up and burned or buried. Where bone-chewing is in evidence the following lick should be made available either in the paddock or mixed with the feed where cows are hand-fed.

Common salt, 50 to 80 per cent.
Lime, 25 to 10 per cent.
Bone meal, 25 to 10 per cent.

3. Fodder damaged by mice, by moulds, or by moisture should not be fed to stock nor should stock be allowed access to such fodder. Special care, therefore, is necessary during mouse plague periods and the season of summer and autumn rains.

Puncturing the rumen with a sterilized trocar and cannula for administration of a drench, as described on the previous page.

Fixed Prices for—

Hay, Chaff, Straw and Oats

Prices of hay, chaff, and straw and feed, milling, and seed oats are fixed in an order issued recently by Professor Copland the Commonwealth Prices Commissioner. Maximum prices have been declared on a Melbourne basis country prices being the Melbourne price, minus freight if selling to Melbourne or plus freight if buying from Melbourne.

The prices are :—

Product.	Growers' maximum Selling Price, Best Quality, Melbourne Basis.	Merchants' Maximum Wholesale Price, Best Quality Melbourne Basis.
	Ton.	Ton.
Meadow hay (including 30 per cent. clover or lucerne)	£5 12 6	£6 0 0
Rye and other grass, meadow hay	4 12 6	5 0 0
Hay for chaffing	5 0 0	..
Derrick pressed hay	6 2 6	6 10 0
Lucerne hay (derrick pressed)	7 0 0	7 10 0
Chaff	..	7 12 6
Lucerne chaff (at least 95 per cent. lucerne)	8 15 0	9 5 0
Straw	4 15 0	5 0 0
	Bushel.	Bushel.
Feed oats	0 2 9½	0 2 11
Milling oats	0 3 1½	0 3 3
Ungraded seed oats	0 3 7	0 3 8½
Clipped and graded seed oats	..	0 4 3½

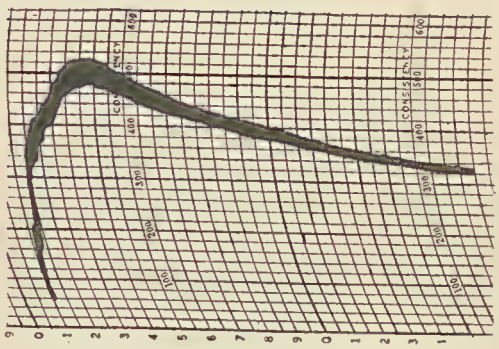
For sales by retail of any kind or quality of hay, straw, chaff or oats, as the case may be, the maximum price must be no greater than will allow the retailer the same margin of profit as was ruling on sales at 16th June, 1943.

VICTORIAN F.A.Q. WHEAT

Analysis of 1944 Sample

By W. R. JEWELL, M.Sc.,
Agricultural Research Chemist

A portion of the official F.A.Q. wheat sample, made available by the Victorian Chamber of Commerce, has been critically examined as in previous years. The results of analysis, and of milling and baking tests, are given below, together with results for the preceding seven years, for comparison.



Farinogram for 1944 sample of F.A.Q. wheat.

TABLE I.—ANALYTICAL RESULTS.—WHEAT.

—	1937.	1938.	1939.	1940.	1941.	1942.	1943.	1944.
Moisture (per cent.)	12·7	11·8	9·1	10·7	11·0	10·5	11.2	11·2
Impurities (screenings) (per cent.) ..	4·5	5·3	3·4	4·1	3·8	5·3	3.7	4·9
Ash (per cent.)	1·34	1·30	1·26	1·43	1·20	1·23	1.2	1·2
Protein (N x 5·7) (per cent.) ..	9·80	11·09	12·81	9·78	11·74	10·28	11.10	10·40
Bushel weight (lb.)	62	63½	64½	63½	64¼	63¾	64¼	65
Pelshenke figure-minutes	24	28	36	26	39	32	33	37

Wheat

The bushel weight, which was struck at 65 lb., constitutes a record high figure. The sample has a bright and fairly plump appearance, and has a normal dockage, consisting mainly of small and broken grain, husks, straw, and a few weed seeds; the reported dockage (screenings) includes all grain less than 2 m.m. The protein content, 10·40 per cent., is about up to average, but its quality, as measured by the Pelshenke figure is rather higher than usual.

TABLE II.—ANALYTICAL RESULTS.—FLOUR

—	1937.	1938.	1939.	1940.	1941.	1942.	1934.	1944.
Moisture (per cent.)	..	11·6	11·1	12·6	12·4	13·2	13.6	13·4
Yield (per cent.)	71·3	73·8	71·3	72·9	73·2	70·0	71.7	70·0
Ash (per cent.)	0·50	0·48	0·54	0·48	0·47	0·48	0.46	0·40
Protein (N x 5·7) (per cent.) ..	9·12	9·92	11·17	8·78	10·43	9·04	10.0	9·03
Wet Gluten (per cent.)	26·4	30·4	38·7	28·8	30·8	25·7	30.0	28·0
Dry Gluten (per cent.)	8·4	9·9	12·2	9·5	10·4	8·6	10.1	9·4
Water Absorption—								
Hand (per cent.)	50·2	50·6	50·0	50·2	52·5	51·5	52·0	51·0
Farinograph (per cent.)	..	54·5	63·0	57·4	61·8	57·5	57·5	55·4
Maltose Figure	142	152	168	155	152	142	110	108
Valorimeter No. (Farinograph) ..	..	34	46	42	44	38	39	39

Flour

The cleaned wheat, conditioned to 15 per cent. moisture, milled freely to give a normal yield of clean, bright flour of low ash content. The maltose figure is lower than usual, a fault that can be rectified by the addition of malt flour or malt extract.

The gluten content, while not high, is equal to the average value for the past eight years. Quality, as measured by the Farinograph is satisfactory; the Farinograph diagram is shown in the illustration and is generally well balanced.

The results of the standard baking tests are given in Table III.

TABLE III.—STANDARD BAKING TESTS (100 GR. FLOUR).—LOAF VOLUME IN C.C.

	1938.	1939.	1940.	1941.	1942.	1943.	1944.
Basic	450	397	392	442	440	440	405
Basic + malt + phosphate	510	475	460	517	475	490	475
Basic + malt + phosphate + bromate	490	517	497	561	460	505	515

The basic loaf is immature and of pale crust; the malt phosphate addition has improved volume, crust and general appearance, confirming that baking properties can be materially improved by the use of yeast foods. An additional improvement has resulted from the further addition of bromate, the loaf being a very good one, both in volume and appearance. This indicates that this season's flour will improve with age and will respond to the use of improvers.

Although the gluten content is not high, the baking tests show that a good loaf, equal to that of last year, is obtained with the malt—phosphate—bromate procedure, and that flour from this season's wheat should prove satisfactory under bake-house technique, including the usual use of improvers.

Normal yields of bran and pollard were obtained, with protein (N x 6.25) contents of 14·0 per cent. and 16.0 per cent. respectively.

RYECORN—FOR GRAZING AND DRIFT CONTROL—continued from page 154.

Ryecorn is capable of providing more green fodder than any other cereal, but should be used only for grazing. The hay is coarse and tough, while the grain has a peculiar taint, and is unpalatable to stock.

Ryecorn is the outstanding cereal for sowing badly drifted areas that are to be reclaimed, and in the control of drifting sand in general. However, when areas have been stabilized and reclaimed, they must be treated carefully. Some modification of the fallowing practice, to assist in the reduction of erosion, should be adopted and the grazing should be strictly controlled, ensuring that areas liable to drift should not be over-grazed.

The common Victorian varieties are Black Winter, and an unidentified strain originating in South Australia. The latter is particularly suitable for sand-drift control, while the former has a larger grazing period.

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Burnley Egg-Laying Competition

Final Results 1943-44

By H. F. CLINTON, Poultry Expert

THE thirty-third Egg-laying Competition for fowls, conducted at the Burnley School of Primary Agriculture and Horticulture, commenced on 1st April, 1943, and concluded on 1st March, 1944, a period of 48 weeks.

The Single Test Competitions continue to be well supported by breeders, as the whole of the accommodation provided for this competition was filled. The accommodation consisted of 236 pens, each housing one bird.

As was the case in this year's competition, it is again pleasing to note that for the 1944-45 competition, which has just commenced, very many more applications were received than could be accepted for the accommodation available. This support indicates that the competition is appreciated by breeders.

The beneficial effect of the competition on the industry as a whole is widely recognized. The introduction to commercial poultry farms of the progeny of birds which have distinguished themselves at Burnley has greatly improved the quality of Victorian flocks generally, and the size of eggs produced.

Although at the end of the 48 weeks' period no bird had laid a sufficient number of eggs to enable it to qualify for retention for the full twelve months in an attempt to break the present Burnley egg-laying record, some very good scores were recorded.

The Burnley competition was inaugurated in 1911, and the highest twelve months' record for a single bird of any breed since that date was made by an Australorp entered by Mr. F. W. Becker in the 1940-41 competition. This bird laid a total of 340 first-grade eggs in 52 weeks, and 312 in 48 weeks.

In the 48 weeks' competition just concluded, the best performance was that of a White Leghorn, in the Wet Mash Class, owned by Mr. W. J. Cooke. This bird laid 294 first-grade eggs, the highest score in all classes of the competition, and four eggs more than the highest score in the previous competition, laid by an Australorp.

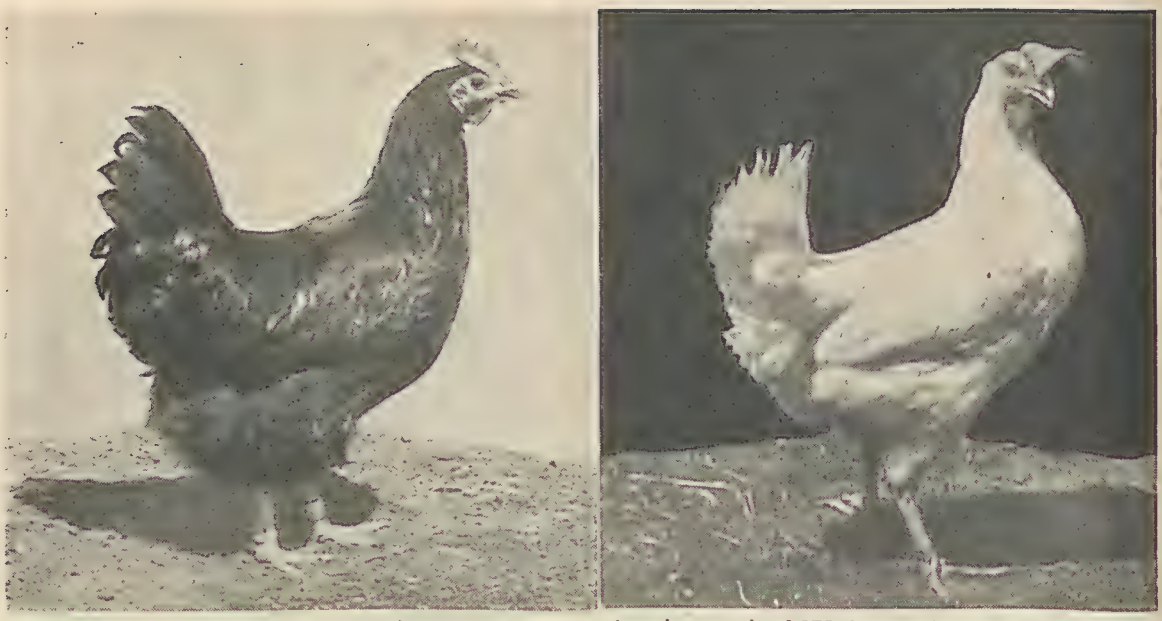
The highest number of eggs in the Competition (294 first-grade) was laid by this White Leghorn owned by Mr. W. J. Cooke.

Very good scores were also achieved by White Leghorns, in the Wet Mash Class, owned by Mr. A. T. Dent and Mr. T. L. Eastaugh, which laid 279 and 276 first-grade eggs respectively.

An Australorp entered by Messrs. Sweeney Bros. laid a creditable score of 275 first-grade eggs. A White Leghorn fed on dry mash, owned by Mr. K. C. McKenzie, laid a total of 272 first-grade eggs.

A Rhode Island Red owned by Messrs. Milledge Bros. laid 252 first-grade eggs, a good score for this breed. A Light Sussex, owned by Mr. B. H. Leonard, Tasmania, laid 242 first-grade eggs, and a Langshan, owned by Mr. R. D. Wilson, New South Wales, laid 223 first-grade eggs.

Keen interest continues to be taken in Rhode Island Reds, and 36 birds of this breed competed this year.



Left—Messrs. Sweeney Bros.' Australorp winner of Class 4 with a total of 275 first-grade eggs. Right—This White Leghorn owned by Mr. K. C. McKenzie gained first prize in Class 2, Dry Mash Section with a total of 272 first-grade eggs.

The mortality among the competing birds was 8·5 per cent. Two birds died from heat apoplexy. As it is in the interest of all poultry breeders to improve their flocks and reduce mortality, competitors should exercise special care in the selection of the stock used to produce birds for egg-laying competitions, and breed only from those possessing a high degree of constitutional vigour.

In the competition, prize certificates and sashes were awarded for the greatest number of first-grade eggs laid. During the first two months of the competition a first-grade egg must weigh not less than $1\frac{3}{4}$ ounces, and thereafter not less than 2 ounces. At Burnley, every egg is weighed to one-tenth of an ounce. The records are available for examination by any competitor.

The Awards

Single Test.

In the class for White Leghorns fed on wet mash, first prize was won by Mr. W. J. Cooke, and he was also awarded a first prize Burnley

TABLE SHOWING MONTHLY LAYING RETURNS.

Month.	Light Breeds.			Heavy Breeds.					
	White Leghorns.			Australorps.			Other Heavy Breeds.		
	Average No. of Birds.	Total.	Average.	Average No. of Birds.	Total.	Average.	Average No. of Birds.	Total.	Average.
April	132	1,431	10·8	58	909	15·7	46	653	14·2
May	132	1,717	13·0	58	1,202	20·7	45	519	11·5
June	132	1,866	14·1	58	1,242	21·4	45	620	13·8
July	132	2,100	15·9	57	1,190	20·9	45	699	15·5
August	132	2,640	20·0	57	1,060	18·6	44	777	17·7
September	131	3,142	24·0	57	1,322	23·2	44	912	20·7
October	131	3,229	24·6	57	1,019	17·9	44	925	21·0
November	130	2,853	21·9	57	1,115	19·6	44	856	19·5
December	130	2,858	22·0	56	907	16·2	44	816	18·5
January	130	2,583	19·9	56	704	12·6	44	728	16·5
February	129	2,111	16·4	56	803	14·3	44	588	13·4

Champion Sash, with a bird that laid 294 eggs, all first grade, the highest score in all classes of the competition. Mr. A. T. Dent gained second prize, and he was also awarded a second prize Burnley Sash, with a bird that laid 279 eggs. Mr. T. L. Eastaugh followed closely for third prize, and he was awarded a third prize Burnley Sash, for a bird with a total of 276 eggs.

In the White Leghorn class, fed on dry mash, first prize was won by Mr. K. C. McKenzie, with a bird that laid 272 first-grade eggs. Second prize went to Mr. W. J. Cooke, whose bird laid a total of 265 eggs, and the Ultima Young Farmers' Club gained third prize with a bird that laid 256 eggs.

In the class for Australorps, Messrs Sweeney Bros., winners in this class last year, won first prize with a bird that laid 275 eggs, all first grade. Mr. T. L. Eastaugh's bird gained him second prize with a total of 269 eggs, and a bird entered by the Grenville Stud Poultry Farm followed closely for third place with a total of 267 eggs.

In the class for Rhode Island Reds, Messrs. Milledge Bros'. bird won first prize with a total of 252 first-grade eggs. Mr. J. Armstrong followed closely for second prize with a bird that laid 250 eggs, and Mr. A. J. Glanfield's bird obtained third place with 237 eggs.

In the class for All Heavy Breeds, other than Australorps and Rhode Island Reds, Mr. B. H. Leonard, Tasmania, won first prize with a Light Sussex (242 eggs, all first grade), Mr. R. D. Wilson, New South Wales, secured second prize with a Langshan that produced 223 eggs.

Cost of Feeding, &c.

There were 236 fowls in the competition at its commencement, but twenty birds died. The total number of days these latter birds collectively were in the pens was 4,487, which is equal to approximately thirteen birds having been there for the full 48 weeks. Therefore,

Light Sussex owned by Mr. B. H. Leonard laid 242 first-grade eggs.

STATEMENT SHOWING THE NUMBER OF EGGS LAID BY THE VARIOUS BREEDS IN THE COMPETITION, AND THE AVERAGE NUMBER OF EGGS LAID PER BIRD.

Breeds.	Number of Birds After Allowing for Deaths.	Eggs Laid.			Average Number of Eggs Laid per Bird.		
		First Grade.	Underweight.	Total.	First Grade.	Underweight.	Total.
Light Breeds—Wet Mash—							
White Leghorns	73	14,814	392	15,206	202·9	5·4	208·3
Light Breeds—Dry Mash	56	11,164	66	11,230	199·4	1·2	200·5
Total Light Breeds—Wet and Dry Mash ..	129	25,978	458	26,436	201·4	3·6	204·9
Heavy Breeds—Wet Mash—							
Australorps	56	11,225	225	11,450	200·4	4·0	204·5
Rhode Island Reds	34	6,215	37	6,252	182·8	1·1	183·9
Other Breeds	10	1,853	5	1,858	185·3	0·5	185·8
Total Heavy Breeds	100	19,293	267	19,560	192·9	2·7	195·6
Total All Breeds	229	45,271	725	45,996	197·7	3·2	200·9

The winning Rhode Island Red owned by Milledge Bros. This bird laid 252 first-grade eggs.

the total number of birds in the competition for the whole period may be regarded as 229, and this is the figure used in working out the average, &c.

The different kinds and quantities of food fed to the birds during the currency of the competition were as follow:—

Wheat, 9,420 lb.; hulled oats, 2,761 lb.; cracked maize, 3,801 lb.; bran, 5,154 lb.; pollard, 8,239 lb.; meatmeal, 161 lb.; dried whey, 190 lb.; dried butter milk, 32 lb.; meat, 213 lb.; onions, 79 lb.; grit, 1,246 lb.; salt, 74 lb.

The total number of eggs laid, including those under weight, was 45,996 an average per bird of 200·9 for the 48 weeks.

The price realized for the eggs averaged a fraction under 1s. 9½d. per dozen. The market value of the eggs averaged £1 9s. 11½d. per bird, and the cost of food averaged 12s. 3d. per bird, a fraction over 3d. per week; thus the return over cost of food for 48 weeks averaged 17s. 8½d. per bird.

The prices received for the eggs, however, are exclusive of freight or commission charges, &c. Also it must be remembered that the eggs were laid by pullets in their first year of production, kept in single pens the conditions being entirely different from those on commercial farms, where birds of various ages are kept in large flocks.

Prize List—1943-44

SINGLE TEST.

Class 1.—White Leghorns—Wet Mash.

FIRST PRIZE—CHAMPION CERTIFICATE, ALSO BURNLEY CHAMPION SASH.

Pen No.	Name and Address.	Total Eggs.	Under-weight.	First Grade Eggs.
123	W. J. Cooke, 8 Mount-street, West Preston, N.18	294	..	294

SECOND PRIZE—GOVERNMENT CERTIFICATE, ALSO SECOND PRIZE—BURNLEY SASH.

Pen No.	Name and Address.	Total Eggs.	Under-weight.	First Grade Eggs.
158	A. T. Dent, "Ridgeway," Sellars-street, Greensborough	279	..	279

THIRD PRIZE—GOVERNMENT CERTIFICATE, ALSO THIRD PRIZE—BURNLEY SASH.

Pen No.	Name and Address.	Total Eggs.	Under-weight.	First Grade Eggs.
171	T. L. Eastaugh, Point Nepean-road, Highett, S.21	276	..	276

Class 2.—White Leghorns—Dry Mash.

FIRST PRIZE—CHAMPION CERTIFICATE.

Pen No.	Name and Address.	Total Eggs.	Under-weight.	First Grade Eggs.
227	K. C. McKenzie, 82 Clarence-street, Geelong West	274	2	272

SECOND PRIZE—GOVERNMENT CERTIFICATE.

Pen No.	Name and Address.	Total Eggs.	Under-weight.	First Grade Eggs.
196	W. J. Cooke, 8 Mount-street, West Preston, N.18	267	2	265

THIRD PRIZE—GOVERNMENT CERTIFICATE.

Pen No.	Name and Address.	Total Eggs.	Under-weight.	First Grade Eggs.
233	Ultima Young Farmers' Club, State School No. 3426, Ultima (Breeder:—A. Martin)	256	..	256

Pen No.	Name and Address.	Total Eggs.	Under-weight.	First Grade Eggs.
	Class 4.—Australorps—Wet Mash.			
	First Prize—Champion Certificate.			
57	Sweeney Bros., Ararat ..	275	..	275
	Second Prize—Government Certificate.			
55	T. L. Eastaugh, Point Nepean-road, Highett, S.21	270	1	269
	Third Prize—Government Certificate.			
6	Grenville Stud Poultry Farm, Springvale-road, Springvale	267	..	267
	Class 5.—All Heavy Breeds other than Australorps and Rhode Island Reds—Wet Mash.			
	First Prize—Champion Certificate.			
59	B. H. Leonard, Bracknell, Tasmania (Light Sussex)	242	..	242

Pen No.	Name and Address.	Total Eggs.	Under-weight.	First Grade Eggs.
	Class 5.—All Heavy Breeds other than Australorps and Rhode Island Reds—Wet Mash—*continued.*			
	Second Prize—Government Certificate.			
68	R. D. Wilson, Willoyse Poultry Farm, St. Ives, N.S.W. (Langshan)	223	...	223
	Class 5.—Rhode Island Reds—Wet Mash.			
	First Prize—Champion Certificate.			
95	Milledge Bros., 24 McKinley-street, Echuca East	253	1	252
	Second Prize—Government Certificate.			
83	J. Armstrong, 657 Bell-street, West Preston, N.18	250	..	250
	Third Prize—Government Certificate.			
99	A. J. Glanfield, 132 Separation-street, Northcote, N.16	238	1	237

FIRST CLASS CERTIFICATES OF MERIT TO HENS IN CLASSES 1, 2, AND 4 WHICH LAID 240 FIRST GRADE EGGS, AND IN CLASSES 3 AND 5, WHICH LAID 220 FIRST GRADE EGGS.

Pen No.	Name and Address.	First Grade Eggs.
	Class 1.—White Leghorns—Wet Mash.	
131	A. L. Heath, "Edenhope," Westall-road, Springvale	272
108	E. A. Head, 38 Serrell-street, East Malvern, S.E.5	267
149	Lenham Poultry Farm (F. Smith), Terang	261
172	T. L. Eastaugh, Point Nepean-road, Highett, S.21	260
170	K. C. McKenzie, 82 Clarence-street, Geelong West	254
132	A. L. Heath, "Edenhope," Westall-road, Springvale	250
148	Lenham Poultry Farm (F. Smith), Terang	249
115	C. R. Fagg, 76 Maud-street, Geelong ..	248
173	Miss M. Martin, 23 Clonaig-street, Brighton East, S.6 (Breeder:—A. Martin)	247
	Class 2.—White Leghorns—Dry Mash.	
235	A. Martin, 23 Clonaig-street, Brighton East, S.6	255
195	W. J. Cooke, 8 Mount-street, West Preston, N.18	251
182	Grenville Stud Poultry Farm, Springvale-road, Springvale	246
210	Lenham Poultry Farm (F. Smith), Terang	243
179	A. R. Marshman, Archie's Creek ..	242
214	T. A. Pettigrove, 159 Hawdon-street, Heidelberg, N.22	241
230	D. M. Jenkins, 21 Speight-street, Newport, W.15 (Breeder:—A. Martin)	241
186	C. R. Fagg, 76 Maud-street, Geelong ..	240

Pen No.	Name and Address.	First Grade Eggs.
	Class 4.—Australorps—Wet Mash.	
23	R. A. Wilson, "Braeburn" Poultry Farm, Duncan's-road, Werribee	261
22	F. W. Becker, Follett-road, Cheltenham, S.22	260
19	"Sun Rise" Poultry Farm (G. A. Manallack), Lockwood-road, Kangaroo Flat	256
53	Mrs. J. T. Cornish, Healesville ..	251
9	T. J. Crewther, Carlow-street, East Bentleigh, S.E.15	248
2	C. E. Graham, Portarlington	246
20	"Sun Rise" Poultry Farm (G. A. Manallack), Lockwood-road, Kanagaroo Flat	241
29	C. Fenton, Phillip-street, Rushworth ..	240
	Class 5.—Rhode Island Reds—Wet Mash.	
94	L. B. Bryan, 58 Yarralea-street, Alphington, N.20	234
93	L. B. Bryan, 58 Yarralea-street, Alphington, N.20	233
76	G. Winter, "Denehurst," Murgheboluc ..	229
72	A. Perkins, 5 Eastgate-street, Pascoe Vale South, W.7 (Breeder:—H. Perkins)	228
75	G. Winter, "Denehurst," Murgheboluc ..	228
96	Milledge Bros., 24 McKinley-street, Echuca East	226
84	J. Armstrong, 657 Bell-street, West Preston, N.18	223

PREVENTION OF POULTRY DISEASES

By H. F. CLINTON, Poultry Expert

TO POULTRY KEEPERS.

The Department of Agriculture is anxious to help all owners whose stock may be affected by disease. Unfortunately some poultry keepers appear to be disinclined to report cases of notifiable diseases proclaimed under the Stock Diseases Act, apparently because they fear their operations may be hampered by unnecessary restrictions. This attitude is not justified, as any action taken has as its immediate object the benefit of the individual as well as the industry. Where such outbreaks have been reported promptly to the Chief Veterinary Inspector, the advice given frequently has enabled the owner to avoid the heavy economic loss that would have been incurred had the disease not been speedily diagnosed and properly treated.

Poultry farmers who are experiencing sickness or mortality in their flocks should send a live, sick bird to the Veterinary Research Institute, Story-street, Parkville, N.2, where a diagnosis will be made free of charge. In addition, a letter should be forwarded to the Director of the Institute notifying him of the dispatch of the bird and setting out the history of the case.

THE principle that prevention is better than cure is especially applicable to poultry, because fowls are commonly kept in such large flocks that disease may spread very rapidly and cause considerable loss before it is recognized. The poultry-keeper should make a special study of the underlying principles of the subject of prevention at the very beginning of his career, for it may mean all the difference between success and failure.

Infectious diseases of poultry are due to micro-organisms, and when these gain entrance into the body and multiply in the organs, tissues, or cavities, and produce disease, an infection is said to occur, and the disease so produced is called an infectious one.

Infection may be brought on to the poultry farm on the clothing and boots of persons coming from infected farms; and vehicles, crates, utensils, or anything used for the conveyance of birds, may also act as a medium for the introduction of disease. Infection can be conveyed from one part of the farm to another in the same way. Another method by which infection may occur is by the introduction of diseased stock. It might be thought that this could easily be prevented, but such is not the case. Every infectious disease has what is known as a period of incubation, that is to say, a more or less definite time elapses in each disease from the entry of the organism into the body till the appearance of the first symptoms indicating that the animal is diseased, and it may happen that stock are purchased and moved on to a farm in that period. Again, there are many diseases which may develop in either acute or chronic form, and birds affected chronically will often show very little sign of the disease, or there may be no sign at all, especially if the conditions under which they are living are good as regards feed and general hygiene. Later, when adverse conditions occur, the disease may again become active. In some diseases carriers (that is, birds which are affected and infectious to others, but which at the time show no signs of disease) may spread infection. Further, it is not usual for the purchaser to know sufficient of the symptoms of various diseases to be able to say whether birds are affected or not, and owing, therefore, to one factor or another, a diseased bird is introduced into the flock.

Both external and internal parasites at times lead to severe disease and mortality among poultry. Poultry ticks, by inoculating birds with an organism, produce a disease known as tick fever. By constantly irritating a bird both day and night, red mite, lice, worms, and other parasites lower its vitality, and disease finds an easy victim. Dust baths, spraying, and certain general measures of good management, go far in preventing infestation by these pests.

Hygiene

Poultry hygiene is a very important factor for consideration if permanent success is to be looked for by the poultry-keeper. It is of far more value to understand what good hygiene means than to possess any number of isolated and more or less correct ideas as to the treatment of sick stock. The cure of sick birds is not always possible, and rarely profitable, since those that recover seldom regain the vigour which they formerly possessed. Too many people, however, instead of informing themselves concerning sanitary measures, wait until their flocks become diseased, and then try to combat the disease. A surer and less expensive means is to surround the flock with healthful conditions, which will go far towards preventing disease.

In poultry-keeping, many may be successful for a time in defying the laws of sanitation and hygiene; in fact, a very few may be successful for quite a long time; but eventually the majority will find that thorough and intelligent attention to these laws will be one of the best guarantees of permanent success that they can find. Whenever stock are kept under more or less confined and artificial conditions, the question of good hygiene becomes one of first importance.

Housing and Equipment

A very considerable proportion of ill-health may be more or less directly traced to errors in the selection of the site for the poultry farm, and in the construction of buildings in which the birds are to be housed all or part of their time. The structures should not be placed on low-lying, swampy or badly-drained ground, or on ground likely to be flooded. Birds living under damp and cold conditions are likely to become affected with colds and roup-like diseases, and so much of the energy derived from their food is expended in maintaining bodily warmth that they become unprofitable.

The buildings should be located on a rise of the ground where drainage is away from instead of towards its foundations. No moisture should come through the floor, as it would thus be difficult to keep the litter dry, as it must always be, if health is to be preserved. The floor should be at least 6 inches higher than the surrounding ground. A properly laid cement or brick floor is safe, sanitary, and permanent. Floors should always be well covered with 4 to 6 inches of dry and clean litter, otherwise they will be cold and uncomfortable. This will also enable the birds to have plenty of exercise, which is very necessary in order to keep them in the best condition. Houses for adult fowls should be open-fronted and face the north or east; the back and end walls should be wind-proof. It is essential that the sun should shine right into the house, and help to keep the air pure and sweet. It will also help to keep in check vermin, which thrive in dark, badly-ventilated houses. Houses should face the north in those localities which are practically free from north winds or are protected by shelter.

Overcrowding must be avoided, and if fowls are to be kept on the intensive system, 4 square feet of floor space should be allowed for each bird. The house should be high enough to allow of good ventilation, and to enable the work to be performed in comfort. It should not be less than 8 ft. high in front and 6 ft. at the back, and deep enough (about 20 feet) to allow the birds to roost well away from the front of the house so that they may shelter from the weather when necessary. About 8 inches of perch room should be provided for each bird. Perches should be 16 inches apart, all on one level, and not more than 2 ft. 6 in. from the floor. A manure pit provided at the back of the house under the perches will prolong the life of the scratching litter.

Ventilation should be provided for by a 6-inch opening, with a hinged board, the full length of the house at the back, close to the roof. This allows a current of air to pass through and, in addition, it will help to keep the roof cool even in the hottest weather. It will also help to prevent moisture-laden air from accumulating within the laying house.

All fixtures, perches, &c., should be easily movable so that cleaning and disinfection may be performed thoroughly and quickly.

The provision of clean nests is very important, in order to guard against the eggs becoming soiled. Shellgrit has been found to be a good material to place in the nest boxes in order to keep the eggs clean. At the State

Research Farm, Werribee, it has been observed also that nests provided with shellgrit are always free of vermin.

Care in Feeding

It should be a rule never to feed any food which is not clean, sound, and wholesome. Mouldy, sour, or decomposing foods should never be fed. Regularity in feeding and suitable foods assist in maintaining a healthy stock. Foods should be stored in vermin-proof receptacles. Undoubtedly, the best results are obtained by including fresh, succulent green food in the ration. A regular supply of grit and charcoal should always be available for the birds.

The most rapid method by which infectious diseases of all kinds are transmitted through a flock of birds is by means of the drinking water. Therefore, a constant supply of fresh, clean water should always be at hand.

Management of the Birds

Great care in the selection and mating of the breeding stock is necessary if the resulting progeny are to have a high degree of constitutional vigour and the power to resist disease. Once a bird has been sick, it should never be used in the breeding pen.

When stock are purchased, temporary accommodation should be provided in which the birds can be kept until the purchaser is reasonably satisfied that they are healthy.

Sick and dead birds are a menace to the flock. It has been frequently observed that some poultry-keepers take a sick bird from amongst the flock and allow it to roam anywhere about the farm. This is a bad practice. Sick birds should be isolated immediately, and if they do not respond readily to treatment, should be killed. Every dead bird should be burned (not buried) just as soon as death has occurred. If it is buried, one never knows when, by means of dogs, rats, worms, and insects, infectious material may be brought to the surface.

Cleaning and Disinfection

All buildings or structures in which poultry are housed should be subjected regularly to the most thorough cleaning and disinfection. All the litter and loose dirt should be removed, the house (floors, walls, and ceiling) given a thorough sweeping and cleaning out, and all parts of the house well sprayed with a good disinfectant. There are many good preparations that will serve the purpose. The chief thing is to use an effective disinfectant, and plenty of it.

How often the general cleaning requires to be done throughout the year depends on the system under which the birds are kept. In some cases the droppings should be removed daily. Under other conditions a regular cleaning once a week would suffice. In any circumstances, a good general clean-up should be carried out every three months.

Food and water vessels and systems should be cleaned and disinfected regularly. On farms where automatic water systems have been installed, the pipes should be cleaned out with a good suction pump or flushed through with the aid of pressure from the water supply. A suction pump similar to that used for pumping water out of gas pipes has been found to be useful for this class of work. It is an advantage to pass a hot soda solution through the pipes, as this helps to remove any decomposing filth.

Before the incubator season commences, incubators, brooders, and brooder houses also should be thoroughly cleaned and disinfected.

A most important operation is the control of red mite. Although not hard to kill, great difficulty is often experienced in getting at their hiding places, so that sheds and perches should be as free from cracks and crevices as possible. The perches can be painted with tar to fill up any cracks, and the joinings treated at intervals with a good disinfectant. During spraying operations special attention should be given to all woodwork, particularly that around the place where the birds roost. For the treatment of lice on the birds, the dust bath should always be kept in order. Individual birds that are badly infected with body vermin may be dusted with a good insect powder.

When many fowls are run continuously on the same land, the ground becomes contaminated, and contaminated ground is responsible for the perpetuation of many diseases from which birds suffer. Ploughing and sowing a crop will help to overcome this difficulty, and also to ensure a sweet soil.

LIVE STOCK NOTES

Compiled by A. C. T. HEWITT, M.Agr.Sc., Live Stock Science Officer

Pigs can be Raised Successfully in Winter

A PIG-RAISER from Queensland visiting a Victorian pig farm expressed surprise that pigs could be raised successfully in the cold and wet Victorian winter. He knew from experience that pig production was more difficult in winter than in summer even in Queensland where, on the whole, temperatures are higher and wet days are fewer in winter than they are in Victoria.

However, when provision is made to meet the adverse conditions of winter, pig production in the Victorian winter is just as successful as it is in the warmer and drier parts of Australia.

The most serious problem which winter presents to pig-raisers is that of providing a food to replace separated milk, which forms the greater part of the diet of pigs during summer.

In winter, when the milk supply is too low to provide the bulk of the diet of pigs, some farmers resort to the futile practice of adding water to the separated milk to make it go further, whereas they should add more grain or pollard, using 1 lb. of either to replace 1 gallon of separated milk. If this is done, and the small quantity of milk available is distributed among all the pigs, they will not suffer much from a shortage of food.

Another winter problem is that of providing a dry and warm sleeping place for pigs. Pigs dislike the wet in winter more than they do the cold.

These comforts may be provided by having ample shed space, which is protected from rain and wind, and by providing an abundance of dry straw bedding. The bedding should be so deep that pigs can burrow into it for warmth instead of piling on top of one another in their attempt to keep warm, and thus submitting to the ill effects of overcrowding and bad ventilation.

Fouling of the straw bed can be largely prevented in pens by partitioning off a part of the pen to which the pigs may go to dung. This dunging place should be distinct from the feeding and sleeping places and it should be roofed, because pigs have a disinclination to leave their dry shed to go out in the rain.

The maintenance of good growth rates, and the prevention of sickness and deaths among pigs by the adoption of the above suggestions, will achieve the increase in production of pig meats so urgently required by the nation as surely and more economically than an extension of pig-breeding programmes.

[L. A. Downey, H.D.A., Pig Expert.]

Care of Horses in Winter

The Senior Veterinary Officer, Mr. W. D. Shew, advises that, with the approach of winter, horses at work may be given an increased and more stimulating ration. Stabled horses are better clipped, except for the legs. Working horses, not stabled, should also be clipped and fitted with a good type of waterproof canvas rug. All horses, of course, must be groomed thoroughly every day, especially those being rugged. The rugs, too, should be brushed daily on the underside.

Horses at pasture should have their feet regularly trimmed and before the winter, when necessary, their teeth should receive veterinary attention. Regular dental examinations are essential to keep horses sound and well.

Weaned foals should have plenty of nourishment; excellent additions to their diet are half a pound of crushed oats, together with a tablespoonful of di-calcic phosphate and, if succulent pastures are not available, one or two tablespoonfuls of a cod liver substitute, several of which are available, in a little damped bran and chaff should be added to the ration twice daily.

Starting a Poultry Farm

Poultry farming may be conducted successfully wherever the land is well drained, and a permanent water supply is available. As regards locality, it must be recognized that proximity to a grain-growing area or marketing centre means reduced haulage of foodstuffs on the one hand, and in the marketing of produce on the other.

Successful poultry farming requires a considerable amount of experience, and for the beginner it is recommended that a start should be made in a small way, and the flock built up as experience is gained. For those intending to take up poultry farming as an occupation, not less than 5 acres of land should be procured. This area should be sufficient to grow all the green food necessary for up to 5,000 birds.

The most profitable branch of poultry farming in Victoria is egg production, and the breeds best developed for this purpose are the White Leghorn and Australorp. White Leghorns are kept in the largest numbers. Australorps, which are also largely kept for egg production are also very suitable table birds. Rhode Island Reds have been kept to a smaller extent, but have been improved considerably for egg production during the last few years, and are excellent table birds.

The best method of building up a good flock would be to purchase day-old chicks from the best commercial poultry farms, which are free from disease, during the months of July, August, and September.

Some essentials for success are good birds, good feeding, and clean and comfortable conditions.

A leaflet, "The Small Poultry Flock," giving additional details for the beginner, may be obtained free on application to the Department of Agriculture.

[H. F. Clinton, Poultry Expert.]

Bees

After a season such as that just experienced, with thousands of colonies of bees on the verge of starvation, an increase in disease may be anticipated. Foul brood is a contagious disease affecting the larvae or young bees while in the brood cells, causing them to die before reaching maturity. The disease was introduced into Australia with bees imported from America about the year 1870. Twenty years later it was firmly established in Victoria, New South Wales, and South Australia. At that time little was known concerning the origin and control of the disease, and many bee-keepers endeavouring to stabilize their industry in the vicinity of some of the finest honey-producing forests in the country were forced to abandon their attempts. This check, received at a critical period in the development of the bee-keeping industry, had a bearing on the throwing open of large areas of yellow box forest for selection by graziers, who subsequently destroyed the timber before foul brood was brought under control, and the industry organized to effectively demonstrate the full value of the timber as a national asset.

With the present scarcity of nectar, bees are more prone to enter strange hives in an attempt to remove the stores, and in this way a weak colony affected with foul brood and unable to

[Continued on page 174.

War Agricultural Committee Notes

Compiled by THE CENTRAL EXECUTIVE

Electricity Supply for Agricultural Purposes

SHORTLY after the outbreak of war, the shortage of manpower and materials made it impossible for only a few new consumers to be connected to an existing supply of electricity. As a result, many farmers who had been contemplating changing to electricity for driving their farm plant had to postpone their activities in this direction for the time being.

With the change in Australia's role in the Allied Nations' war plans and the consequent need to increase the country's food production, it became more than ever necessary that farmers should be able to procure farm equipment and the power necessary to drive it. Since electricity provides an important source of power on farms, it was realized that, in many cases, the provision of electricity to farmers would, materially increase production. In cases where elderly people are carrying on farms, especially dairy farms, while the younger generation are absent the provision of electricity to run the farm plant has often been the means of preventing a serious decline in production.

Material therefore, was made available so that primary producers could be connected to a supply of electricity where required for productive purposes. A plan was drawn up in consultation with the supplying authorities under which new extensions to farmers' properties would be made on the recommendation of the War Agricultural Committees. These recomendations in all cases will be based solely on a consideration of production.

Farmers, who require a supply of electricity for farm purposes, should interview their Local Supply Authority to ascertain whether it is possible to supply it. The application will then be referred to the District War Agricultural Committee for its recommendation and is then forwarded via The Central Executive to the Regional Controller of Electricity for Victoria. Should a supply of materials be necessary to enable the supplying authority to make this extension, such material will be provided through the Controller of Electricity.

At the outset of this scheme, it was considered unwise to allow connexions to be made for household lighting purposes except in special cases. This decision was necessary in view of the shortage of materials and man power for the internal wiring of houses. Recently, however, the situation has eased and a supply for household purposes can be granted as well as for productive purposes. Primary producers who obtained a supply under the original scheme and who require further supplies for household purposes should contact the Local Supply Authority with a view to having the matter reconsidered.

The scheme for the supply of electricity has now been operating for about six months and the War Agricultural Committee has handled 600 applications, of which 10 per cent. only have been refused. A farmer having once been refused may apply to have his case reconsidered if new circumstances arise which would materially alter his production programme.

Some difficulty still exists however regarding the provision of high tension extensions, because of the fact that considerably more manpower and material are required to make one high tension extension than to make a low tension extension. The War Agricultural Committees base their recommendation solely on production, irrespective of whether high or low tension is involved, the Regional Controller of Electricity for Victoria having the final say in view of possible difficulties in regard to the manpower and supply position.

It is hoped that, by the provision of electricity extensions to farmers, much of the heavy demand on small internal combustion engines will be relieved.

Fencing Materials

The bush fires which swept through many districts recently damaged or destroyed about 30,000 miles of boundary and essential subdivisional fences and every effort is being made to obtain materials for the repair and reconstruction of these fences. On the 18th January all fencing wire and steel posts with the exception of high tensile black pig fencing (8 wire x 30 inch) and special galvanized

poultry netting (72-in. x 2-in. x 17-gauge) were frozen by the Controller of Materials Supply for bush fire relief. To date, the Controller has released considerable quantities of 12½-gauge black barbed wire, 10-gauge black plain wire, 12½-gauge black high tensile wire, 10-gauge, galvanized plain wire, 42-in. x 1½-in. x 17-gauge black wire-netting, 42-in. x 1½ in. x 17-gauge galvanized wire-netting, 12-in. x 1½-in. x 17-gauge galvanized wire-netting, 36-in. and 30-in. x 3-in. and 4-in. x 14-gauge galvanized sheep netting, black 8 wire x 30-in. pig fencing, assorted farm gates, 5 ft. 6 in. steel fencing posts and punched 5 ft. 6 in. Army tag pickets have already been released.

At the present time, the following materials are available or in production.

Barbed Wire, 12½-gauge, black. Two thousand five hundred tons of 12½-gauge black barbed wire have been made available by the Commonwealth Government from Army stocks at £10 per ton in 10-ton lots, f.o.r., East Oakleigh, for the repair of fences damaged by bush fires. This wire is mostly high tensile, is in 56-lb. and 100-lb.. coils and is in good condition, being as new or only slightly rusted. It has been incorrectly described as being 14-gauge.

Plain Wire, 10-gauge, galvanized. This wire is in production and regular but limited supplies are available.

Wire-Netting, Rabbit, 42-in. x 1½-in. x 17-gauge galvanized. This netting is in production and regular but limited supplies are available.

Wire Netting, repair, 12-in. x 1½ in. x 17-gauge galvanized. Very limited supplies of this netting are being produced.

Pig Fencing, black, high tensile, 8-wire x 30-in. Reasonable stocks of this wire are available for pig fences only and a special priority is being given to repair pig fences destroyed by fire.

Gates. Limited numbers of farm gates of various sizes are being manufactured as supplies of piping become available.

Steel Fencing Posts 5 ft. 6 in., black, lacquered. These are being manufactured at Newcastle at the rate of approximately 20,000 per week.

Punched Army Tag Pickets 5 ft. 6 in., black, un-lacquered. These are similar to the steel posts mentioned above, but are not lacquered and have five tags cut from them. The Victorian Bush Fire Relief Committee arranged for nearly 300,000 of them to be punched to take wire in the same manner as new steel posts and sold for 1s. each f.o.r., Melbourne, to farmers whose fencing posts have been destroyed by fire. Already 250,000 of these posts have been distributed.

On the recommendation of the District and Local War Agricultural Committees, the above-mentioned materials will be released as they become available to fire sufferers. To facilitate distribution of these materials and to expedite release, farmers are advised to lodge their orders with local retailers.

LIVE STOCK NOTES—continued from page 172

resist the invaders may be the means of infecting numerous colonies. The transferring of hive fillings from an affected to a healthy colony is another common cause of infection.

To detect infection the brood should be regularly examined. Healthy brood has a convex or domed appearance and an even colour. Any cells that are sunken and appear darker in colour than those surrounding them should be treated with suspicion, and the capping removed. Healthy larvae will appear pearly white in direct contrast to those affected with disease, which will appear as a formless jelly-like mass. A common and fairly reliable test is to insert a fine twig into the suspected substance contained in the brood cell. If the twig has a glue-like substance adhering to it when drawn out a short distance it is fairly safe to assume that the brood is affected, in which case the matter should be immediately reported to the Superintendent of Live Stock, Department of Agriculture, Melbourne, C.2, when an inspector will be sent to assist and advise in the control of the disease.

[J. W. Thomlinson, Apiary Inspector.]

SUN-DRYING OF TOMATOES

By D. G. QUINN, Viticulturist

THE production and canning of tomatoes in Victoria has increased remarkably of recent years due to the demands of the Services and an abnormally bouyant civilian market. References in the literature to the drying of tomatoes is scarce. Cruess (C) describes a commercial method of dehydration and a factory process of throwing the tomato pulp on to a hot revolving cylinder and evaporating the product down to the form of a slab is known, but no references to attempts to dry the tomato by ordinary field methods have been located. As the tomato is a very rapid ripening and perishable crop, the development of a satisfactory sun-drying process would be a valuable alternative for occasions when other channels of disposal were unavailable. For this reason some sun-drying experiments were attempted this season and yielded promising results.

The tomato has very little food value from the point of view of energy production, but it has a high vitamin and flavouring value. The dried product should have a strong appeal in the off season in the production of soups, stews, and other preparations where a tomato flavouring is desired. As the tomato contains negligible quantities of sugar and starch, the drying ratio is particularly low, but the product is bulky, three pounds filling a gallon measure.

Experimental Drying Procedure

1. Tomatoes were dried satisfactorily when halved and exposed to the sun for a week during warm summer weather.

2. A very slight improvement was noted when the cut side of the fruit was immediately sprinkled with table salt at the rate of 1 lb. per 20 lb. of fresh fruit.

3. A further slight improvement on procedure (2) was gained when the whole fruit was immersed for 3-4 seconds in a boiling solution containing 1 lb. of caustic soda to 10 gallons of water, prior to cutting and salting.

4. A product decidedly superior in appearance and flavour was obtained by using procedure (3), but with the addition of 1 oz. of powdered potassium metabisulphite to each pound of salt used. The final dried product contained 13 grains of sulphur dioxide per lb., and had a drying ratio of 10 : 1.

Explanation of the Procedure.

After reaching the full ripe stage, all fruits and vegetable tend to degenerate and to lose their nutritive value, unless the ripening process, caused by the enzymes of the fruit, is arrested by high or low temperatures, or by dehydration. In fruit, it is impracticable by sun-drying to remove all the natural moisture and consequently degeneration is only slowed down consideraby. One of the simplest tests to indicate whether enzymic action is continuing in a dried product is to observe whether any browning or other colour change occurs, as oxidase enzymes are known to cause this. Our experiments showed that such was the case in procedures 1, 2, and 3.

The "blanching" or quick heating process is applied to some vegetables to kill or check enzymic action in the dried product, but this does not appear a practical treatment for the tomato, and to offset this weakness potassium metabisulphite was added in procedure (4), to cause the pulp of the fruit to become impregnated with the volatile preservative sulphurous acid. This latter substance is used in the drying procedure of all light-coloured fruits, and in the correct amount its beneficial properties far exceed any undesirable feature it may possess. American research workers have recorded that various dried vegetables not treated with sulphur dioxide steadily lose nutritive value, palatability, ascorbic acid, carotene (*a*), and vitamins A and C (*b*).

It should be noted that fruit slowly cured by sun-drying loses more sulphur during the process than is lost when dehydrators are used.

Sulphurous acid is most simply introduced into fruit by treatment in a sulphur box as recommended by Cruess, but we found the fumes of sulphur were absorbed very rapidly, and experienced difficulty in controlling the dose. Hence it is probable that the sprinkling of a given quantity of fruit with a given quantity of a cheap bisulphite salt is the simpler method for the home producer or the tomato-growing sharefarmer to adopt. [*Continued on page* 177

A SKIN DISEASE OF SHEEP

Dermatitis due to a Mite

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IN New South Wales some three or four years ago, a skin disease of sheep came under notice which closely resembled the condition associated with lice infestation of sheep. No lice could be found, however, and upon closer investigation the cause of the trouble was found to be a mite *Psorergates ovis* (pronounced sorr-erg-at-ees). This mite, which cannot be detected by the naked eye, causes much damage to the fleece and a chronic irritation of the skin.

The trouble exists over a wide area in New South Wales, where up to 20 per cent. of some flocks have been infested. It has occurred also in the south-eastern and northern parts of South Australia, but has not yet been identified in Victoria, although it is likely that some flocks may be infested.

To Detect Infested Sheep

Mite infested sheep have the appearance of those infested with body lice. Advanced cases show intense irritation, rub against trees, logs and fences, and also bite and scratch affected parts; their fleeces soon present a ragged appearance, particularly on the sides, flanks and thighs. Affected wool shows a thin, thready staple with a wispy tip; the skin is tough and may show a dry or greasy scurf.

Fig. 1—Above: Normal staple from uninfested skin. Below: Abnormal staple from infested skin on the same animal, but eight inches away from normal staple. [After *Aust. Vet. Jnl.*

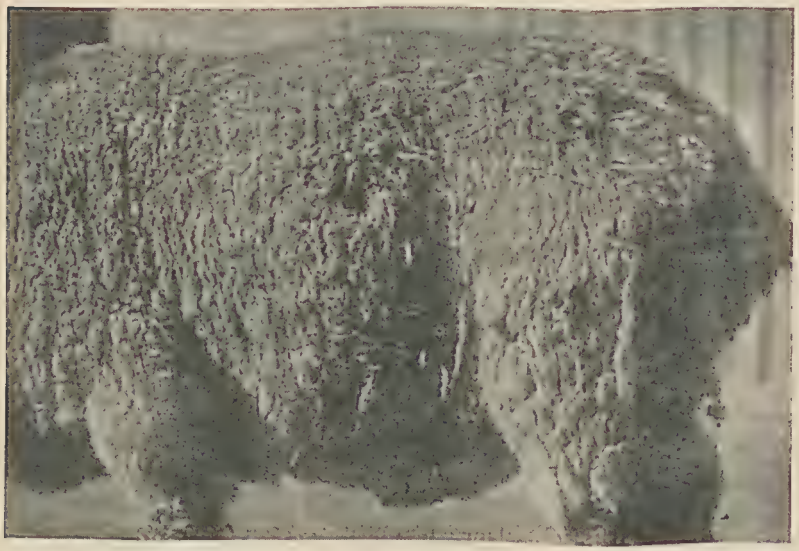

Fig. 2—A typical case. Merino ewe infested with Psorergates ovis, showing formation of ragged tassels. [After *Aust. Vet. Jnl.*

It is often difficult to pick out infested sheep in the early stages. Usually it is some weeks after shearing before the trouble is noticed because, as the wool length increases, fleece abnormality becomes more evident. Infestation spreads very slowly, and it may be two or three years before the condition extends over the whole body.

Diagnosis

The first appearance of the disease is usually a small whitish patch on the side, showing the typical stringy staple with a dry, spiral-pointed tip, as illustrated in fig. 1 on previous page.

In scrapings taken from an affected sheep the mite can be seen under a microscope. Sheep-owners suspecting the disease are advised to take scrapings from the skin of at least two square inches, and from more than one site if possible. The wool from the selected square should be clipped off with curved scissors as close to the skin as possible, or preferably shaved. Apply liquid paraffin to the skin and then scrape the skin fairly deeply and vigorously. Put the scrapings in a small bottle with a little paraffin added, and forward to the Chief Veterinary Inspector, Department of Agriculture, Melbourne, together with a letter giving full particulars of the outbreak. As the mites are often in small numbers, scrapings from more than one area, or a live sheep, should be sent, if possible. When available, an affected fleece or portion of same should be forwarded for examination. If sending a sheep or fleece address to the Director, Veterinary Research Institute, Story-street, Parkville, via Spencer or Flinders-street Railway Station, and advise the Director by telegram the time of dispatch.

Treatment

As the life history of this mite is not yet known, proved effective methods of treatment have not been evolved. Trials with dipping in New South Wales have shown that annual dippings with arsenical or carbolic dips did not control this mite, but that dipping with a lime-sulphur dip had proved fairly satisfactory, and can be recommended. Care should be exercised in dipping, and all sheep in an affected flock should be dipped because if only the obviously affected sheep are dipped, many cases will be missed and the trouble will continue in the flock.

Lime-sulphur dips can be prepared on the farm, but it is safer to use an approved manufacturer's dip.

SUN-DRYING OF TOMATOES—*continued from page 175.*

In bean curing, table salt is used to prevent enzymic degeneration. Salt was introduced into our tomato drying experiments for both this reason and as a cheap "filler" to add weight. After drying, the salted samples were more strongly flavoured and more palatable than those not salted. However, under humid conditions salt is hygroscopic, and after six weeks storage traces of mould (*g. Mucor*) were observed in all unsulphured samples. Furthermore, under humid conditions sulphur dioxide vaporises rapidly, so that future experience may prove that the tomato should either be dried without salt, or be stored in airtight containers after drying, to prevent the absorption of moisture.

Prior to cooking, the dried tomatoes should be soaked in water for a few hours. It will be found that they do not regain anything like their original size; but in tomato flavour they are very strong. It is advisable after soaking to ensure that the pulp is well broken up, particularly in soups, as this assists in the dissemination of tomato color, which tends to be low.

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IN THE ORCHARD

Contributed by Officers of the Horticultural Division

UNDER present conditions of labour shortage on all orchards it is difficult for fruitgrowers to carry through their normal programme for pest control. Consequently, there has been a tendency for losses due to insect and fungal damage to increase, and this deprives the nation of supplies of important vitamin-containing foods. However, if the labour available is utilized to the best advantage, it should be possible to keep losses at a minimum and production at a maximum.

The chief weapon in pest control is the spray pump, and, to be effective, thoroughness and correct timing of the spray application should be the aim. Make sure that the spray pump is in good condition, so that there will be no hold up for repairs during the spraying season. An adequate pressure of 300 to 400 lb. per square inch should be available, particularly where trees are large.

Don't regard spraying as a routine job which can be got over with as little thought as the morning shave. Remember that, to be effective, complete coverage of the entire tree is necessary, and that missing the tip of a limb may spoil the whole job on that tree by providing a starting point for insects or fungi.

Timing of sprays likewise is of importance. Last spring, for instance, there was a serious outbreak of green peach aphis, and growers had to waste much time applying sprays of nicotine sulphate in an endeavour to control this pest. This was largely due to failure to apply the correct spray at the correct time in the winter.

The eggs of the green peach aphis are laid on the trees during the winter, and an egg-killing spray such as tar distillate or "D.N.C." applied from the middle to the end of July, when the greatest number of eggs are present, should be completely effective.

Sprays of lead arsenate for codling moth control should be applied when moths are most active, so that the fruit will be well covered when the young grubs hatch out. Advice as to the times when sprays are most needed is available in all apple and pear districts. By confining sprays to periods of moth activity it may be possible to reduce the number of sprays required during the season.

Sanitation or the removal of hiding places of insects and fungi will also save sprays. For instance, the codling moth population of an orchard can be greatly reduced by thoroughly scraping the butts and lower parts of limbs

of trees to remove loose bark which would provide suitable cover for grubs in the winter. Bag bandages should be tied around the butts of trees, and regularly examined every ten days during the summer for the removal of grubs. Brown rot infection of stone fruits may be lessened by gathering and burning all old infected fruit lying on the ground or stuck in the trees.

By a combination of efficient spray programmes and sanitation, losses due to pests can be kept at a minimum.

Harvesting Navel Oranges

Although the majority of growers will delay harvesting their oranges because price fixing has prevented early fruit from realizing higher prices, it is expected that some of the fruit will be removed within the next few weeks. Before any large quantity of fruit is harvested, however, samples should be submitted to the local packing shed for analysis. Ten cubic centimetres of the juice expressed from five oranges taken at random from a consignment should require not more than 24 cubic centimetres of N/10 soda solution to neutralize the acidity of the juice. It may be desirable to treat the fruit in an ethylene gas chamber in order to improve the skin colour. Gas treatment only hastens the development of colour, and does not ripen immature fruit. Fruit which is immature when picked will become pale and unattractive in colour.

It has been found that the concentration of ethylene may be reduced to 1 cubic foot per 1,000 feet of chamber space. The humidity inside the chamber should be kept high by placing tins of water inside. The temperature should be kept in the vicinity of 60°F., and during cold weather it may be necessary to use electric radiators, or some other heating appliance.

IN THE GARDEN

By J. L. PROVAN, B.Agr.Sc., Principal, School of Horticulture, Burnley

Winter and Spring Flowering Annuals

THE planting of winter and spring flowering annuals can be continued during early April, and seedlings of Iceland poppy, calendula, nemesia, viola, pansy, cineraria and primula can be planted in well-prepared soil. It is an advantage at this time of the year to plant all these seedlings in raised beds, so that surface drainage will enable the first 6 inches of the soil to remain warmer and drier than it would be if the beds were flat.

Cinerarias

The seedlings of cinerarias should be planted under shelter, either along walls or under shrubs and trees. These seedlings require plenty of light, but also need protection from frost. In dry positions be sure that they do not suffer from lack of water; sometimes when these seedlings are planted at the foot of walls they receive very little rain and therefore must be watered by hand.

The most popular cinerarias at present are the Grandiflora strain. These grow to a height of about 1½ feet and produce large, well-formed flowers with a good range of colours. It is possible to obtain this Grandiflora strain in mixed as well as in separate colours. The separate colours include heavenly blue, blue with a white centre, crimson, dark scarlet and brilliant scarlet.

Another form of this plant is the Stellata or Star-shaped strain, which grows to about the same height, but the flowers are not so compact.

The Virginian Stock

The fragrant Virginian Stock, while still a member of the same large family as the ordinary, large-flowered Stock, is not in the same genus. Its botanical name is *Malcolmia maritima*, and it is sometimes called the French Forget-me-not. It can be used for edgings, long borders and for window boxes.

The seed should be sown from now until the spring, and usually, where it is to remain. Thin out the plants to about 6 inches apart. The colours are—mixed, white, yellow, crimson, carmine, &c. It grows to a height of about 6 inches to 1 foot.

Nemophila

Nemophila is a hardy, blue-flowered annual which carries its white-centred flowers on stems about 1 foot tall. Sow the seed now in a cool and partially shaded place, and it is advisable not to transplant. A rich light soil suits it best.

Primula

The primula is a perennial but in our gardens it is usually treated as an annual. It makes an excellent subject for window boxes and for winter and spring borders in the garden. It grows to a height of 12 to 18 inches, and is also a good subject for pot plants and can be brought indoors when it commences to flower and will continue flowering for a long period if placed in a sunny position. It may be used also for massed bedding effects out-of-doors. It is a plant which does fairly well in a semi-shaded position and flowers from twelve to fourteen weeks. Various colours are available and include lilac, white, rose pink and crimson. Seedlings may be transplanted now, or seed may be sown for transplanting later to provide blooms in late spring. At this time of the year self-sown seedlings will often be found in undisturbed soil where primulas were growing last year. Space the plants 6 to 8 inches apart, and an application of 6 oz. to the square yard of lime will be found beneficial. Suitable varieties are *Brilliancy,* which is a dark purplish red, *Princesss Mary,* a rose lilac, *True Rose,* a rose shade and *Dawkin's Pink,* a good deep pink.

THE VEGETABLE GARDEN

Cabbage

Transplant seedlings of *East Ham* and *Savoy* cabbages, spacing the rows 30 inches apart and 24 inches between the plants in the rows. Cabbage plants should always be placed in well-prepared soil and at this time of the year in raised beds. If the beds are 3 ft. 6 in. to 4 feet wide, 2 rows can be planted in each bed, and for a home garden this is the most satisfactory arrangement.

Cauliflower

About the middle of the month transplant seedlings of *Late Metropole* cauliflower, spacing the rows 36 inches apart with 30 inches between the plants in the rows.

Lettuce

Seed of *New York, Imperial D.* and *Webb's Wonderful* may be sown this month and the seedlings transplanted as soon as they are large enough. If plants are available, these can be transplanted also during April. Space the plants 12 inches apart each way and choose a warm sunny situation.

Onions

Transplant seedlings of *Silver Skin, Early Barletta* and *Australian White Queen.* The rows should be about 10 inches apart with 3 to 4 inches between the plants. Sow seed of *Early Brown Globe, Odourless* and *Victorian Brown* in seed beds.

For spring onions, seed of *White Lisbon* can be sown in rows this month.

Rhubarb

Old beds of winter rhubarb can be dug up this month and the crowns divided and replanted in well manured and deeply dug soil. When dividing the crown choose the younger portions which contain two or more eyes with a portion of the fleshy root system and some fibrous roots. When planting, keep the eyes just above soil level.

Put your money into the FIRST VICTORY LOAN

Some New—

CANNING PEACH VARIETIES

By R. S. HARPER, B.Agr.Sc.,
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American Hybrids Available for Commercial Planting

The short-comings of many varieties of canning peaches grown in the Goulburn Valley district of Victoria, and the Murrumbidgee Irrigation Area of New South Wales, have been realized for many years by growers, canning interests, and research workers alike. These shortcomings are briefly dealt with hereunder.

Levis Cling, one of the earliest canning varieties in the Goulburn Valley, is often difficult to bring up to canning size ; it is not usually a heavy cropper, it tends to drop when nearly ripe, and furthermore comes to maturity when growers are busy with W.B.C. pears. Palora is susceptible to rust, is not a very vigorous tree and, on many soil types, the fruit tends to be small. Sim's Cling is not popular with the canners because it tends to be soft in the flesh. Goodman's Choice tends to run small, and is not favored by canners because of the excessive amount of red at the centre. Phillip Cling, ideal from a canning point of view, is not a good variety in the orchard because of its biennial bearing habit, its tendency to split stones, and susceptibility to gummosis. Golden Queen, also a high quality canner, is susceptible to rust, usually has to be thinned to bring it to canning size, and has to be harvested rapidly once it matures. Pullar's Cling, probably the best variety from the growers' financial point of view, is uneven in shape and has a red centre. Thiele's Cling is redder still around the pit, and the discoloration often extends into the flesh. It is also very susceptible to rust, and not regarded as a good canner. Healesville is an intense red at the centre and through the flesh, it has a large pit, and is susceptible to rust and brown rot.

The realization of such weaknesses in the various varieties has caused many changes in the industry—varieties are " fashionable " for only a limited period—and has led to a search for new and improved varieties.

Source of The Hybrids

IN 1934, Mr. W. Young of Kelvin Orchard, Ardmona, visited the United States Department of Agriculture Experimental Orchard at Palo Alto, California, and was impressed by some new peach hybrids developed by Mr. W. F. Wight, Botanist, at that Station.

Mr. Young made arrangements for thirteen of these varieties to be sent to him through the United States and Victorian Departments of Agriculture, for trial on his orchard at Ardmona. Owing to the possibility of introducing Fireblight, Peach Yellows, or other serious diseases with the scion material, precautionary quarantine measures had to be taken. Arrangements were made to have the peaches budded on stocks at the Burnley Horticultural Gardens, Melbourne, which were gazetted as a temporary quarantine station.

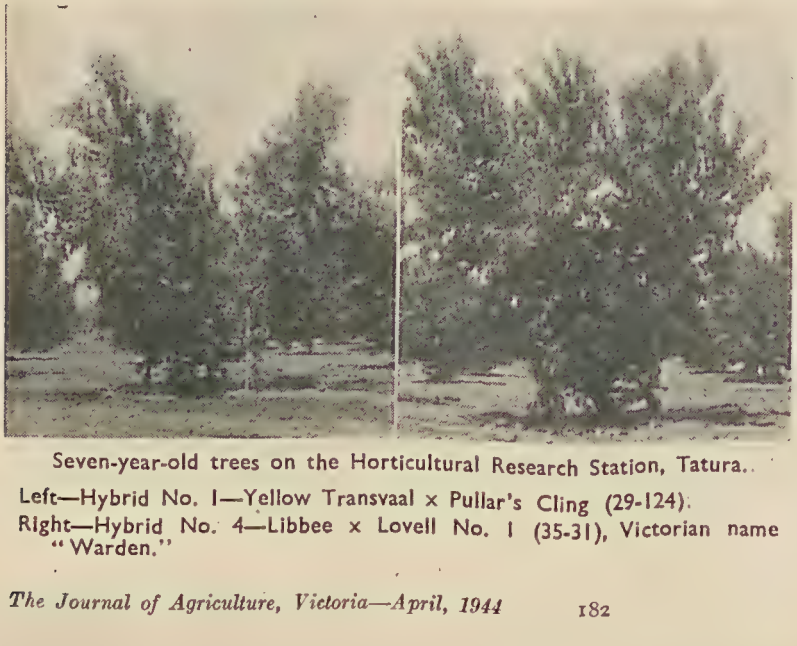
Scions of the thirteen varieties were consigned per S.S. *Monterey* in January, 1935 and budded on peach and plum stocks at Burnley shortly after their arrival. All buds took and made good growth during the spring and summer of 1935-36. In January, 1936, they were inspected by the Victorian Department of Agriculture's Biologist, and certified as free from disease. In February of the same year, buds were transferred under Departmental supervision to two-year old peach stocks at Kelvin Orchard, Ardmona. As a further precautionary measure, this section of the orchard was gazetted as a temporary quarantine station for a period of twelve months.

Trees of all thirteen varieties were successfully established at Kelvin Orchard, and, in the following year, the original trees at Burnley Gardens were transferred to the Horticultural Research Station, Tatura.

Observations in the Goulburn Valley

From the outset, in association with peach breeding work at the Research Station, these peach varieties, both at Kelvin Orchard and the Research Station, were kept under close observation. Data with respect to their botanical habits and performance in the field has been gradually accumulated, and for the information of plant breeders, nurserymen, and growers intending to extend their acreage of canning peaches, or replace existing varieties, some preliminary notes on these peaches are presented. It is intended to publish botanical descriptions of these hybrids, or varieties, as they may now be regarded, in a later issue of the Journal. This should help to prevent confusion in their nomenclature, both in Australia and overseas.

These notes, however, are of a preliminary nature only—a full judgment of the merit or otherwise of any variety can be made only over a period of years. An unusual season may produce a weakness not suspected in normal years; the behaviour of a tree in its vigorous youth may be in contrast to that of the mature tree; and so on. Although canning trials on a small scale have been made with these varieties, they are not yet of sufficient value to warrant publication of results.



Seven-year-old trees on the Horticultural Research Station, Tatura.

Left—Hybrid No. 1—Yellow Transvaal x Pullar's Cling (29-124).
Right—Hybrid No. 4—Libbee x Lovell No. 1 (35-31), Victorian name "Warden."

Following these notes on cropping habits a discussion on the selection and use of new varieties will be found.

The Hybrids

The complete list of peach crosses introduced by Mr. Young from Palo Alto is as follows:—

1.	Yellow Transvaal x Pullar's, No. 1	29–12A
2.	Yellow Transvaal x Pullar's, No. 2	28–17A
3.	Lovell x Halford III ..	21–3
4.	Libbee x Lovell, No. 1 ..	35–31
5.	Libbee x Lovell, No. 2 ..	35–34
6.	Phillip's x Linden ..	37–29
7.	Palora x Pratt-Low ..	37–54
8.	Leader Seedling ..	26–13
9.	Pratt-Low x Tuscan ..	21–1
10.	Hauss x Newkom ..	23–1
11.	Hauss x Phillip's	33–23
12.	Palora x Halford I.	22–38
13.	Libbee x Newkom	22–27

NOTE.—The figures are Mr. Wight's reference numbers.

With the exception of Pullar's Cling, Tuscan, Phillip's and Palora, the parent varieties of these hybrids are virtually unknown to Victorian growers, and it is intended to include notes on these unfamiliar varieties in a later article.

Cropping Habits—

1. YELLOW TRANSVAAL x PULLAR'S CLING, No. 1. (29–12A).
2. YELLOW TRANSVAAL x PULLAR'S CLING, No. 2. (28–17A).

Trees of these two crosses are of moderate vigor, and carry heavy crops regularly. The fruit is not quite so rough and uneven in shape as the Pullar's Cling, and is borne along the laterals in dense clusters, like beads on a string. The "self-thinning" character of Pullar's is not so apparent, and it is likely that both crosses would need to be thinned each year.

The fruit exterior is mid-yellow in colour, with a red blush covering from 25 to 90 per cent. of the surface. The flesh is golden-yellow in colour, slightly tinged around the pit with red, and in the case of the No. 1 cross (29–12A)

it is possibly of finer texture than Pullar's Cling. The No. 1 cross matures about March 20th and the No. 2 cross (28–17A) from March 23rd-26th, approximately the same time as Pullar's Cling.

3. Lovell x Halford III. (22–3).

This peach, called "Stanford Cling" by Mr. Young, is a mid-season variety maturing from February 18th-23rd. The trees are vigorous, and bear consistently good crops. The fruit is of medium size, symmetrical in shape, golden-yellow in colour, with a slight mottled red blush. The flesh is a pale to mid-yellow colour, juicy and quite clear at the pit, but it tends to be soft when the fruit is ripe, and may possibly "rag" during canning operations. The fruit is well spread over the bearing area of the tree, and if heavy or bunchy, tends to thin out during the growing season. It does not hang well when mature.

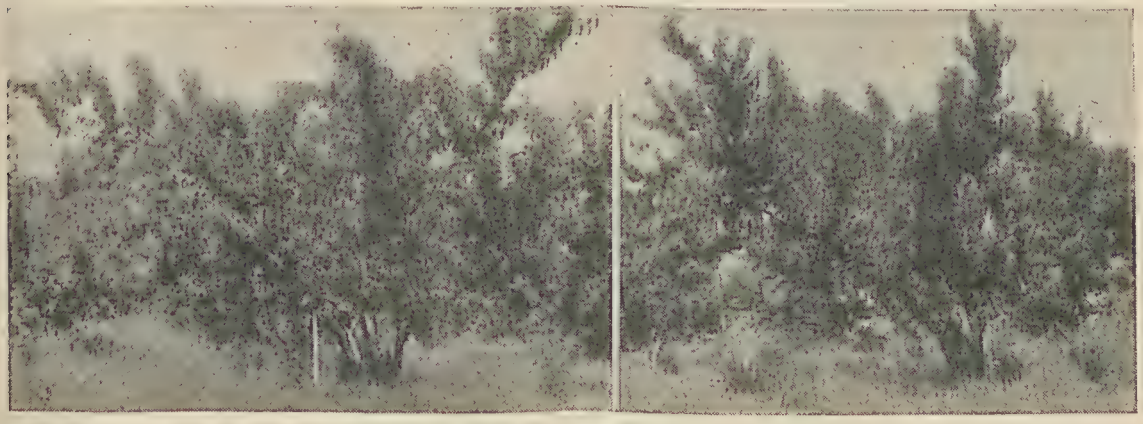
Seven-year-old trees at the Research Station.
Left—Hybrid No. 6—Phillip's x Linden (37-29), Victorian name "Riley Cling," U.S.D.A. name "Ellis." Right—Hybrid No. 7—Palora x Pratt-Low (37-54), Victorian name "Young Cling."

4. Libbee x Lovell, No. 1. (35–31).

Trees of this variety, called "Warden" by Mr. Young, are of vigorous habit and bear consistently good crops of medium to large peaches, maturing about February 12th-14th. The fruit has a brick-red blush covering about 50 per cent of the skin, which is tough and moderately thick. The flesh is a pale golden-yellow colour and fairly tough. There is a reddish tinge around the stone which occasionally extends into the flesh, but this is usually removed during the pitting operation at the cannery. It attains canning size without the need for thinning, but tends to drop when it reaches maturity. It occasionally develops a small percentage of split-stoned fruit.

5. Libbee x Lovell, No. 2. (35–34).

This is a later-maturing crossbred peach of the same parentage as "Warden." It matures about March 1st and is a consistent cropper. The trees are not quite so vigorous as the No. 1 cross, but the fruit usually reaches canning size without any thinning. It has a tendency



Eight-year-old trees on Kelvin Orchard, Ardmona.
Left—Hybrid No. 3—Lovell x Halford III. (21-3), Victorian name "Stanford Cling."
Right—Hybrid No. 12—Palora x Halford I. (22-38), Victorian name "Turnbull Cling."

Eight-year-old trees on Kelvin Orchard, Ardmona.

Left—Hybrid No. 9—Pratt-Low x Tuscan (21-1), Victorian name "Kelvin Cling." Right—Hybrid No. 11—Hauss x Phillip's (33-23), Victorian name "Fairless," U.S.D.A. name "Stanford."

to bear the fruit towards the tips of the laterals, and, in consequence, no shortening of laterals during pruning is desirable. The fruit is pale-yellow in colour with very little blush, and the flesh is a deeper yellow colour, moderately tough, and slightly tinged with red at the stone.

6. Phillip's x Linden (37–29).

This variety, called "Riley Cling" by Mr. Young, and known in America as "Ellis," is moderately vigorous in habit and has most of the characters of the Phillip's parent. It matures about February 16-18th—slightly earlier than Phillip's—and carries fruit which is very similar to that variety. The fruit has a rich yellow coloured skin with a slight area of red blush on some fruit, an equally well coloured flesh, which, although tough, is of good texture and stands up well to canning operations. There is no trace of red at the stone. The point at the apex of the fruit seems less pronounced than in the Phillip's and the stone is slightly smaller. The fruit hangs particularly well on the trees.

This hybrid, however, still has the biennial bearing habit of the Phillip's, and, although it may not be quite so subject to gumming as that variety, a tendency to carry split-stoned fruit is apparent.

7. Palora x Pratt-Low (26–13).

This is an early-maturing, vigorous-growing variety called "Young Cling" by Mr. Young. It is ready for harvest in the second week of January, and is of medium size, smooth, and symmetrical in shape, and has a deep-red blushed skin. The flesh is a rich golden-yellow colour with a faint tinge of red near the pit. It is a consistently heavy cropper with the buds well distributed over the tree, but is likely to need thinning to bring the fruit up to canning size. Although it hangs well on the tree, the flesh appears on the soft or tender side and the fruit may not carry as well as desired.

8. Leader Seedling (26–13).

This variety is possibly synonymous with "Leeton," an open-pollinated seedling of Leader. The trees are slow-growing, of poor vigor and sparse foliage, and carry only light to medium crops of good-sized fruit. The fruit, which matures from January 9-12th, is large, with unequal halves; yellow in colour, with a small area of light-red blush; and hangs well. The flesh, which is golden-yellow in colour, is tough and free from red pigment at the stone. The variety is subject to split-stones, and, owing to this defect, combined with its lack of vigor and poor cropping ability, could not be recommended at present for commercial planting in the Goulburn Valley.

9. Pratt-Low x Tuscan (21–1).

This variety, called "Kelvin Cling" by Mr. Young, matures in the first week of January, and is the earliest yellow-fleshed clingstone variety known in the Goulburn Valley.

It is a fairly vigorous tree of erect habit and a consistent cropper. The fruit, which tends to be of small size, is round and symmetrical, highly coloured and has a dark-red blush covering 50-75 per cent of the surface. The flesh is a rich yellow colour, of good texture, juicy, and slightly tinged with red at the centre. It hangs well on the tree. This variety would need to be thinned to bring the fruit up to canning size.

10. Hauss x Newkom (23–1).

Called "Vincent" by Mr. Young, this is a fairly strong-growing variety maturing about February 10th-12th. It carries consistently

good crops of well-sized fruit. The peach is round-oval in shape, slightly compressed, rich yellow in colour, with a speckled pink-red blush extending over one third of the surface. The flesh is a rich yellow colour, juicy, of fine texture, with a red tinge at the stone which sometimes extends into the flesh. The pit is on the large side, and the variety may have to be thinned at times as it tends to set in bunches.

11. Hauss x Phillip's (33–23).

This variety, called "Fairless" by Mr. Young, is known as "Stanford" in the United States of America. The trees are of moderate vigor and carry medium to heavy crops maturing about February 20th-22nd—a few days earlier than Phillip's. The peaches are of good size, rounded and symmetrical, golden-yellow in colour with a red blush covering about one quarter of the surface, usually near the stem end.

The flesh is firm and tough, fine grained, deep yellow in colour, with a trace of red at the pit which does not extend into the flesh. The peaches hang well when mature, but still have some of the disadvantages of the Phillip's parent.

12. Palora x Halford I. (22–38).

Trees of this variety, called "Turnbull Cling" by Mr. Young, are vigorous in growth, heavy cropping, and the fruit matures from January 16th–21st. The fruit, which is of medium size, is round and symmetrical in shape, light to golden-yellow in colour, with a brick-red blush which may cover up to 75 per cent. of the surface of the fruit. The flesh is yellow in colour, of fine texture, juicy and free from discoloration at the stone, which is smaller than usual. The fruit appears to hang well. This fruit sets a heavy crop of fruit which sometimes tends to be bunchy, and would need to be thinned to bring the fruit up to canning size.

A weakness of this variety is its apparent susceptibility to peach rust.

13. Libbee x Newkom (22–27).

This variety, which matures from February 8-12th has carried crops varying from light to very heavy. The trees are of moderate vigor, and the fruit, which varies in size according to the crop, is round in shape, a rich golden-yellow in colour, with a brick-red blush extending over the exposed side of the peach. The flesh is golden-yellow in colour, firm and juicy, with some red at the pit.

Although the foliage of this variety has been infected with peach rust in two separate seasons, there has been no trace of rust on the fruit.

The variety has a tendency to bear on the upper half of the laterals, with the result that the crop is often bunchy and may require thinning.

Choosing New Varieties

In judging the merits or otherwise of any new variety or strain of peach, consideration must be given to a number of factors. Firstly,

Top—Fruit of hybrid No. 7—Palora x Pratt-Low (37-54), Victorian name "Young Cling." Lower—Fruit of hybrid No. 10, Hauss x Newkom (23-1), Victorian name "Vincent."

consider the grower's point of view. A peach variety may be required to fill in a production gap so that the grower will have a number of varieties maturing in sequence throughout the season. Such a programme helps to spread the requirements of harvest labour equally over the season and at the same time ensures a more even flow of fruit to processing lines at the cannery. Growers and canners are therefore showing particular interest in the earlier maturing varieties in this collection—namely, Kelvin Cling, Young Cling and Turnbull Cling—which help to fill in the present gap between apricots and W. B. C. pears.

Growers are also leaning towards earlier maturing peaches to minimize losses from Oriental Peach Moth. In general, losses of fruit due to this pest mount as the season progresses, and, in the really bad years such as 1933-34, up to 60 per cent. of the late maturing varieties—Pullar's, Thiele and Healesville—were rejected on this account.

Varieties combining heavy and regular cropping ability, good fruit size and self thinning habit, with resistance to rust and ability to hold mature fruit on the trees without it getting too soft to handle would be most welcome from the grower's viewpoint.

On the other hand, the canner is interested in varieties that produce good sized, uniformly coloured, tough, symmetrical clear-centered peaches of good canning quality with a small stone or pit. In general, average sized fruit ($2\frac{3}{8}$ to 3 in.) is preferable to either extreme. Small fruit ($2\frac{1}{4}$ to $2\frac{3}{8}$ in.) is canned as halves, large, out-size fruit is usually sliced; but there is a limit to the proportion of these which will be accepted. Post-war canning policy will doubtless be dictated to a large extent by markets available, but, in general, an average-sized peach which gives a standardized number of halves in a 30 oz. can is more satisfactory to the canner. The need for uniform colour and symmetrical shape is self evident. No canner can make an attractive-looking product from a poorly or unevenly coloured peach, and, in the past, overseas buyers have been more attracted by colour than flavour or quality.

Clear-centred varieties are desired because the pigment in the red-centered varieties often discolours the syrup and renders the canned article less attractive. If the red pigment does not extend too far into the flesh, it is often possible to remove it during the pitting process, but such a procedure is wasteful, and results in a reduced output per ton of fresh fruit. For the same reason, varieties with large pits, or pits that present difficulty in hand removal, are not favoured by the canners. The increasing tendency to mechanize all canning operations makes it desirable that the peach will be able to stand up to all operations without becoming bruised or raggy. The trend therefore is toward tougher-fleshed varieties.

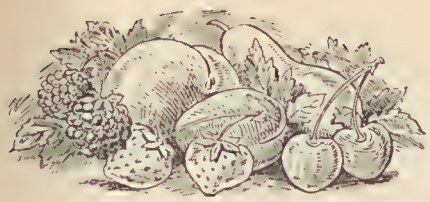
In considering new plantings or replacement of existing areas with these American hybrid varieties, growers must consider all these factors. They should also consult the canneries to which they normally make deliveries.

Some of the varieties dealt with in this article will doubtless find a useful place in the canned fruit industry, but the planting of large areas with any of them is rather to be avoided until the performance of the newcomers has been proven. Our existing varieties have faults, it is true, but they are known faults, and they do possess many good qualities. The introduction of new varieties, all of whose faults and virtues are not yet known, should be a gradual process, undertaken by the growers and the canneries in close co-operation.

Young Trees

Young trees of these new varieties are not available from the Tatura Horticultural Research Station, but may be ordered in the autumn from recognized leading Victorian nurserymen.

Support the First Victory Loan



JELLY MAKING

By RACHEL M. PEILE., Fruit-preserving Expert

A GOOD and well made fruit jelly is always attractive. Flavour, tenderness, and firmness are the chief qualities to be aimed at in jelly making. The jelly should be just firm enough to hold its shape when turned out of the container; also when cut with a spoon or knife, it should retain the angles thus made. It must be clear in colour, and not "syrupy."

Fruit is at its best for jellying when barely, or just ripe, or in other words, "firm-ripe." At this stage of maturity, the pectin—a substance which is perhaps one of the most important ingredients required for jelly—is more abundant than when the fruit is past that condition. Over-ripe fruit is unsuitable for jelly, as at this stage the pectin has become pectic acid, which will not form a good set. Under-ripe or immature fruit contains starch, which is insoluble in water and would cause jelly to become cloudy. In jelly-making as in jam, pectin, together with acid—which is present in the juice—sugar, and heat, are necessary to produce a good jelly, and to obtain a good set, the fruit has to be broken down so that the acid and pectin are dissolved in this water.

Pectin and Acid

The function of pectin in jelly and jam is to hold the sugar and some water in a tiny little clot or net. If too much sugar is used, the clot becomes distended and weakened and the jelly will be soft and syrupy. If the sugar is insufficient in quantity, the net becomes more dense and the jelly is tough or rubber-like. Care must be taken, therefore, to use the correct amount of sugar. The presence of acid is important, as it helps to bring the pectin into solution and brightens the colour of of the jelly.

Suitable Varieties of Fruits

Fruits differ greatly in their pectin and acid content. While many varieties contain enough of both substances to enable the juice to be readily and successfully converted into jelly, others may be rich in pectin, but weak in acidity, and vice versa. Again, some fruits may be deficient, or weak, in both qualities. In these cases, it is only possible to make a good firm jelly by supplying the necessary ingredients. Sour apples are one of the best "assistants" of this kind. In addition to providing the wanted ingredient their flavour is mild, and will blend to advantage with other fruits, allowing the more pronounced flavour to predominate. Lemons also provide an excellent assistant, as the juice contains acid, while the white pith holds a high percentage of pectin. Other fruits which are rich in pectin may, of course, be used for the purpose but most of them when cooked have more colour than the apple, and their flavour also is more pronounced. When blending fruits of this kind consideration should be given to these points. Fruits which have an acid tart flavour are generally rich in pectin and acid.

Fruits which contain sufficient pectin and acid, and therefore will readily make a nice, firm jelly, include fruits at present available, such as sour apples, quinces, and most varieties of citrus fruits. Other fruits not now in season, but which make a good jelly, are red, black, and white currants, loganberries, green gooseberries, most kinds of plums, sour guavas, and blackberries.

Fruits such as strawberries, cultivated cherries, &c., are deficient in pectin, and are not suitable for jelly-making unless assisted.

Method of Making

Put the prepared fruit into the pan with the quantity of water necessary for the variety being used. Some fruits will take a fair amount of water, others very little, and some must be boiled in their own juice only. Boil very gently with the lid on the pan until the fruit is well cooked and the colour partly drawn, then strain first through a colander, where the bulk will be retained, leaving only the juice to be passed through a piece of damp flannel or a flannel jelly bag. This is a quicker method of straining and also results in a slightly clearer jelly. Fruits that are very rich in pectin, such as sour apples and green

quinces, should be extracted a second time. After the first straining has been made, the pulp should be replaced in the pan with sufficient cold water to barely cover it. Simmer again for three-quarters of an hour. The pulp then should be tipped back into the jelly bag and strained as before. The two extracts should now be mixed together. When the juice has been strained, measure it by cup, return to the pan, bring it almost to the boil and add cup for cup of sugar. Allow the sugar to dissolve, then bring the jelly to boiling point and boil rapidly without the lid on.

Honey may be used instead of sugar, using half quantities of each, but if honey is used altogether the flavour will predominate over fruit flavours. It should be borne in mind that a good jelly will not be obtained by a slow boil, nor will jelly set correctly until the pectin, acid, sugar, and juice are in the right proportion to one another, and before this can occur, some moisture must be driven off. Skim the jelly, if necessary. It will soon be noticed that as the jelly continues to boil rapidly, the surface will gradually become covered with small bubbles, and afterwards commence to foam up in the pan. When this occurs it should be tested at once, and if it falls from the stirring rod in thick jellied flakes, or sheets, allow to boil for a further few minutes, and then take it from the heat and pour into dry jars or containers, first binding them around with a warm damp cloth. Seal when cold.

It is most important to bottle jelly immediately it is cooked, otherwise, if left to cool, the small air bubbles, which are carried in when the jelly is being poured, will be suspended in the mixture and unable to escape. As in jam, a prolonged boiling of the jelly after the sugar has been added should be avoided, as this causes the setting properties of the pectin to deteriorate.

The Pectin Test

It is necessary only to take a pectin test when there is uncertainty as to whether the fruit to be used is suitable for jelly, that is, whether it contains sufficient pectin for setting. When the test is carried out and a good clot is obtained, one cup of sugar may be added to each cup of juice. If the clot is only fair, three-quarters of a cup of sugar may be added to each cup of juice. If the clot is badly broken up, the pulp should be discarded as unfit for jelly.

Problems in Jelly Making

Failure of jellies to set may be due to the following causes:—

(1) The use of over-ripe or stale fruit, or poor juice which is lacking in pectin or acid, or both.

(2) Too much sugar.—The pectin in fruit juice is capable of holding a definite amount of sugar in a jellied set. When too much sugar is used, the pectin is broken down, and results in a thick syrup. Sometimes this may be corrected by recooking the jelly with an equal amount of fresh juice.

(3) Insufficient cooking.—Jelly is formed only when the concentration of the syrup reaches a certain point. If the cooking is stopped before reaching this point, a thin syrup is the result.

(4) Over cooking.—When jellies are boiled beyond the finishing point, they become thick and syrupy, owing to the breaking down of the pectin. This will also cause cloudiness.

Cloudy jellies may be caused by—

(1) Juice which has not been properly strained before using.

Cloudy Jelly.

(2) Excess pectin—If there is a large amount of pectin present in the fruit being used, some of it may not dissolve. This may cause cloudiness In such cases where the pectin is suspected to be in large quantities, it is advisable to make two extractions.

(3) Use of immature fruits.—When fruits are too under-ripe, they contain starch which does not dissolve, causing a foggy appearance.

(4) When jelly is poured into jars from too great a height quantities of air are carried in, which form bubbles. These escape with difficulty if the jelly is well made. The edge of the pourer should never be more than one inch above the top of the jar.

Apple Jelly

Crab apples, or any other cooking variety, are suitable. The Rokewood is often preferred on account of its rich colour and flavour. The Dumelow's Seedling is also a favourite, but any sour good cooking apple will give a nice jelly. Wash and wipe the apples, cutting away any defective parts. Slice or quarter them, and level or just cover with water. Boil gently till quite soft (usually about 30 to 45 minutes. Then strain, measure, and add an equal measure of sugar, and boil rapidly till it will respond to test.

Spiced Apple Jelly (suitable for using with cold meats).

Wash the apples and cut them up roughly, then barely cover with a mixture of three parts of vinegar and one part water.

Cook till quite soft, then strain through a sieve. Put the liquid back into the preserving pan and add to it a little stick of cinnamon and some cloves and whole ginger, according to taste. Boil together for about fifteen minutes; then strain, and add three-quarters of a cup of sugar to each cup of liquid. Boil rapidly till it will set when tried.

Some well-liked combinations in which a tart apple juice will supply the necessary additional pectin are: apple and rhubarb, apple and pineapple, apple and mint, apple and blackberry, and apple and peach. Apple juice has a mild flavour and lends itself to various combinations in colours and flavour. The following are a few suggestions for attractive combinations:—

Mint Jelly

1 cup mint leaves (chopped finely and packed tightly).
1 cup apple juice.
¾ cup sugar.
1 cup boiling water.

Pour the boiling water over the clean mint leaves, cover and allow to steep for one hour. Press the juice from the leaves and add two tablespoons of this extract to the sugar and apple juice. Boil until the jelly test is obtained, or to about 222 degrees Fahrenheit, and then add green colouring; if fresh mint is not convenient to use, add two drops of oil of peppermint just before removing the finished jelly from the fire. Pour into hot jars.

Quince Jelly

Use only sour juicy quinces. Make as described for plain apple jelly.

Melon and Orange Jelly

Wipe the melon, and peel or not as preferred. Cut it roughly into blocks, and allow about 10 lb. of melon to 2 lb. of Poorman orange. Put the fruit into the pan with four quarts of water, and cook gently with a lid on the pan for about three-quarters of an hour. Strain and measure, and add an equal measure of sugar; then boil rapidly till it will respond to test.

Apple and Quince Jelly

4 lb. apples.
4 lb. quinces.
6 pints water.

Boil slowly for about an hour with the lid on the pan, strain, and finish as in the case of apply jelly.

Pineapple and Apple

2 lb. pineapple.
6 lb. sour apples.
3 pints water.

Make in same way as apple jelly.

Tubercle-free Herds

Accredited Tubercle-free Herds.

The following herds have been declared free of tuberculosis under the *Accredited Tubercle-free Herd Scheme* conducted by the Department of Agriculture. Under this scheme a tubercle-free accredited herd of cattle is one in which the entire herd has passed two negative, successive, annual physical examinations and tuberculin tests, or upon disclosure of infection, three semi-annual, successive physical examinations and tuberculin tests applied by a State Veterinarian or by a qualified and registered veterinarian who is approved by the Chief Veterinary Inspector for that purpose.

Name.	Address.	Number in Herd.
Ballarat Orphanage	Ballarat	135
Banyule Stud Pty. Ltd.	Wangaratta	31
Black, I. S., Estate	Mount Noorat	53
Clarke, A. B.	Glenormiston South	15
Dennis, Mrs. A. A.	Frankston	42
Dookie Agricultural College	Dookie	85
Dunbar and Clark, Messrs.	"Hazeldean Dairy," Mount Dandenong	18
Geelong Grammar School	Corio	68
Gibson, Mrs. C. S.	"Sweeney's," Eltham	35
Gorman, A. W.	"Cathcart," Alexandra	57
Henry, J. A.	Warrnambool	41
Holloway R. W.	Caldermeade	75
Mrs. G. Howlett and Miss E. Samuel	Lang Lang	55
Jakobi, L. W.	"Granada," Yannathan	80
Kilmany Park Farm Home for Boys	Sale	104
Lawrence, P. H.	"Rainga," Tarrawarra	67
Longerenong Agricultural College	Dooen	43
McNabb and Son, G. A.	Irrewillipe East	154
Nancarrow Bros.	Kerang	52
Northcote Children's Farm	Bacchus Marsh	156
Onley, W. H.	"Glenholme," Caldermeade	64
Parker, Mrs. L. M.	Tallarook	56
Payne, A. E. T.	"Yarra View," Lilydale	63
Payne, T. E. N.	"Woodburn," Kilmore	46
Poole, M. A. and D.	Caldermeade	134
Poole, M. A. and D.	Yannathan	72
Powell, T. S.	"Carellen," Mansfield	46
Richardson Bros., Messrs.	"Faldinghurst," Upper Beaconsfield	30
School of Horticulture	Burnley	6
State Experiment Farm	Ruthergien	37
State Research Farm	Werribee	229
Stephens, Dr. F.	Vermont	32
Tanner, N. J.	Pakenham	33
Vagg, T. E.	Officedale	45
Wells, W. G.	Caldermeade	65

In addition to the above-mentioned, the herds set out hereunder may be considered free of tuberculosis. All these herds have given negative reactions to two or more successive tests conducted by departmental veterinary officers, but inasmuch as replacement cows are only submitted to one test before being admitted to the herds they cannot be considered as accredited under the accreditation scheme which requires, among other things, that no cow shall be admitted to the herds unless it has given two (2) negative reactions at an interval of 60 days, and must be kept in isolation during the period between the two tests.

Name.	Address.	Number in Herd at Last Test.
Abbey, S. G.	Mernda	7
Alexander, Miss R.	Ballarat East	1
Anderson, A. R.	Craigieburn	123
Anderson, J. B.	Warrnambool	19
Andison, J. A.	Thomastown	46
Andrew, T. S.	Whittlesea	91
Andrew, W.	Whittlesea	123
Andrews, E. H.	Templestowe	19
Angliss, Mrs. R.	Ballarat	1
Angus, W.	Moolap	6
Armstrong, Mrs. M. A.	Sebastopol	15
Artley, A.	Sebastopol	11
Atkinson, A.	Cambrian Hill	21
Atkinson, V.	Cambrian Hill	26
Baglin, E.	Wallington	41
Bailey, Mrs. A.	Doreen	11
Baker, A.	Bannockburn	32
Barclay, A. H.	Whittlesea	93
Barker, Mrs. E. M.	Huntly	11
Bates, D. S.	Whittlesea North	25
Bates, J.	Connewarre	21
Batten, R. J.	Wollert	51
Bellis, Mrs. A.	Fyansford	15
Benson, R.	South Morang	35
Bickley Bros.	Wollert	64
Blackmore, P. J.	Ballarat North	57
Blood, J.	Ballarat	8
Booth, Mrs. A.	Warrandyte	7
Bourke, G. J.	Fairfield	82
Bourke, J. W.	Somerton	37
Bourke, W. J.	Alfredton	26
Bradbury, A. K.	Diamond Creek	50
Bradbury, G.	Kangaroo Flat	20
Brady and Cunningham	Doncaster	21
Bray, Mrs. O. C.	Glenroy	34
Brereton, E.	Kennington	25
Brock, J. N.	Epping	16
Browell, L.	Golden Square	15
Brown, J.	Geelong West	7
Brown, Mrs. A.	Malden Gully	11
Brown, R.	Kennington	4
Brownhill, C. E. H.	Bundoora	34
Bryden, A. C.	Bendigo	17
Bumpstead, K.	Moolap	10
Bunting, J.	Craigieburn	34
Bunting, J.	Epping	30
Burke, T. S.	Huntly	19
Burns, D.	Moolap	8
Butler, W.	Wallan	69
Callaghan Bros.	Thomastown	66
Callaghan, L.	Epping	28
Campbell, K.	Broadmeadows	102
Campbell, R. C.	Moolap	54
Cardwell, E. F.	Whittlesea	62
Carroll, M.	Fyansford	28
Carr, G.	Leopold	20
Carr, W. J.	Wollert	62
Carter, R. H.	Fyansford	23
Cavagna, Miss	Sedgwick	7
Challis, L. J.	Connewarre	57
Child, G. P.	Epping	54
Christian Bros.	Doreen	42
Clark, H. M.	Nerrina	18
Clark, P. W.	Whittlesea	58
Clemence, S.	Warrenheip	23
Cochrane, C.	Ballarat North	31
Collins, L.	Doreen	48
Cooke, S. J.	Belmont	38
Cornfoot, D. H.	Whittlesea	43
Coulter, G.	Ballarat North	19
Coulthard, J. J.	Whittlesea	76
Crack, Mrs. E.	Bendigo	12

Name.	Address.	Number in Herd at Last Test.
Craker, Mrs. E.	Warrandyte	2
Cross, G. A.	Mount Rowan	22
Crowe, P.	Gnarwarre	20
Crowle, A. J.	California Gully	16
Cumming, H. R.	South Morang	23
Cupris, A.	Bullock Creek	31
Curtis, W.	Wallington	35
Danaher, J. V.	Whittlesea	70
Danns, N. C.	Whittlesea	27
David, Mrs. M.	Ballarat	2
Davies, A. H.	Drysdale	20
Deutscher, H. W.	Mernda	155
Devereux, Mrs. A.	Ballarat	3
Dickinson Bros.	Sebastopol	54
Dillon, L. W.	Epsom	18
Doggett, T.	Kangaroo Flat	17
Douglas, Mrs. J.	Alfredton	52
Downing, J.	Canadian	5
Draper, L. S.	Wollert	35
Drysdale, J. C.	Warrandyte	41
Duke, J.	Ballarat East	1
Dunstan, W.	Pascoe Vale	32
Dwyer, F.P.	Greensborough	40
Eckersley, W. H.	Alfredton	40
Edwards, S. R.	Sebastopol	14
Elford, S.	Magpie	34
Elliott, W.	Elmore	62
English, N. J.	Donnybrook	47
Faderson, J. H.	Mandurang	108
Fergusson, M. A.	Whittlesea	115
Ferres, Mrs. M. E.	Mount Clear	21
Fitzpatrick, W.	Mandurang	9
Fitzgerald, D.	Leopold	45
Fitzsimons, B.	Lower Templestowe	33
Flanagan, A. D.	Epsom	10
Flynn, O.	Epsom	21
Fox, A.	Mernda	68
Franklin Bros.,	Sebastopol	29
Franklin, F. M.	Sebastopol	15
Friswell, H.	Bendigo	42
Galbraith and Walker	Greensborough	31
Gallagher, J.	Golden Square	20
Gallus, E. H.	Doncaster	14
Gamble Bros.	Greenvale	156
Gardiner, A. M., Estate of	Whittlesea	91
Gardiner, C. E.	Epping	29
Gargan, M. J.	Marshall	43
Gentner, H.	Eaglehawk	9
Gerrett, W. T.	Ballarat North	19
Gibbs, C.	Arthur's Creek	30
Gillies, N.	Diamond Creek	32
Godfrey, W. and W.	Moolap	42
Goulden, J. B.	Wilson's Reef	54
Graff, Mrs. M. G.	Mernda	21
Graham Bros.	Whittlesea	27
Green, J.	Eppalock	15
Green, R.	Leopold	27
Green, W.	Mernda	7
Greer, A.	Wollert	32
Grinter Bros.	Whittington	52
Grinter, T.	Whittington	33
Guldice J. J.,	Kangaroo Flat	17
Gunn, A. J. B.	Ballarat	7
Gunn, W.	Kangaroo Flat	10
Hall, Mrs. J. E.	Whittlesea North	9
Hamilton Bros.	Huntly	17
Hancorne, Miss M. R.	Yan Yean	34
Hanrahan, Miss E.	Sebastopol	4
Hanrahan, N.	Sebastopol	6
Hargreaves, W.	Emu Creek	10
Harmer, L. T.	Thomastown	44
Harrison, H. N.	Ballarat	17
Hawkes, Miss D.	Warrandyte	21
Hayes, J. J.	Smythe's Creek	6
Hedges, J. T.	Ballarat	9
Hehr, R.	Wollert	34
Henderson, J.	Donnybrook	58
Henshaw, E.	Lower Templestowe	9
Henshaw, Miss A.	Templestowe	18
Hewitt, C. J.	Wattle Glen	7
Hewitt, H.	Ballarat	13
Hickinbotham, Miss N.	Whittington	10
Higgs, R. N.	Yan Yean	76
Hilderbrand, P.	Sebastopol	21
Hill, H.	Campbellfield	48
Hill, J.	Somerton	86
Hill, W.	Somerton	39
Hinchcliff Bros.	Whittington	74
Hogan, Miss M.	Cambrian Hill	20
Hobbs, Mrs. F. J.	Doncaster East	5
Hocking, A. R.	Canadian	12
Hoctor, J. and Son	Greenvale	34
Hooper, A.	Moolap	15
Houlahan, P.	Eppalock	40
Houlahan, T. J.	Eppalock	43
Hoy, T.	Kennington	26
Huggins, R. E.	Ballarat	1
Hughes, Mrs. R. E.	Ballarat East	14
Hutchinson, J. B.	Drysdale	23
Jackson, Mrs. M. A.	Heidelberg	11
Jackson, Mrs. M.	South Warrnambool	6
Janefield Farm	Bundoora	43
Jeffrey, J. T.	Mernda	93
Jenkins, Mrs. A.	Mount Rowan	22
Jenkins, T. H.	Whittlesea	22
Jinks, J.	Curlewis	43
Johnstone, Miss J. A.	Mernda	12
Jones, S. E.	Campbellfield	23
Jones, S. G.	Epsom	13
Jukes, C.	Epping	42
Jukes, W. H.	South Morang	28
Junor, G. M.	South Morang	56
Kell, W. E.	Greensborough	28
Kerr, J.	Mandurang	7
Kerwin, H. E.	Eaglehawk	21
Kilpatrick, E.	Mernda	89
Kinnersley, F. and Son	Wendouree	19
Kirkwood, S.	Eaglehawk	12
Knight Bros.	White Hills	42
Knight, G. A.	Sebastopol	29
Knowles, J. T.	Ballarat	3
Lacy, G. C. and Son	Cambrian Hill	32
Lacy, N. C.	Cambrian Hill	13
Lane, J.	Warrnambool	9
Latta, Mrs. J.	Warrnambool	6
Lawry Bros.	Tandara	113
Lehmann, A. H.	Epping	36
Levett, E.	Warrnambool	12
Leviston, A. E.	Ballarat East	25
Leviston, G.	Ballarat East	9
Lewis Bros.,	Beveridge	64
Lincoln, Mrs. L. M.	Portarlington	46
Lloyd, W. M.	Mickleham	6
Lodington, Mrs. I. E. M.	Ballarat	8
Love, J. E.	Strathfieldsaye	16
McAllister, K.	Whittington	36
McCormack, D.	Woodstock	59
McCulloch, A. A.	Warrnambool	28
McDowell, R. H.	Greensborough	26
McGregor, W. B.	Mernda	44
McKay, J. M.	Wallan	70
McKay, L.	Kal Kallo	13
McKay, Miss E.	Donnybrook	51
McKay, Mrs. H. E.	Ballarat South	10
McKendry, J.	Doreen	69
McKenzie, D. I.	Marong	95
McKie, J. W.	Wollert	81
McLean, J. F.	Bundoora	32
McManus, D. J.	Napoleons	18
McManus, J. W.	Napoleons	14
McPhee, K.	Whittlesea	106
McPherson, A.	Yan Yean	82
McQuarie, J. C.	Mickleham	12
Malcolm, W.	Drysdale	31
Maltzahn, Mrs. E. N.	Campbellfield	45
Mannes, W.	Strathfieldsaye	39
Martin, Miss A.	Napoleons	21
Martin, Miss G.	Ballarat	11
Martin, W. B.	Ballarat	20
Mason, Arthur	Donnybrook	62
Mason, N.	Donnybrook	60
Mathieson, A.	Whittington	25
Matthey, A. J.	Bannockburn	111
Maxwell, J.	Whittlesea	32
Mays, Mrs. A. M.	Doncaster	6
Melling, T.	Kennington	16
Menhennett, F. W.	Sebastopol	21
Mercer, H.	Long Gully	18
Millar, Mrs. G.	Smythe's Creek	51
Miller, A. J.	Whittlesea North	50
Miller Bros.	Greensborough	44
Miller, D.	Epping	42
Moller, C.	Wallington	33
Moller, H.	Leopold	38

Name.	Address.	Number in Herd at Last Test.
Moore, R. G.	Moolap	23
Morris, C.	Sebastopol	28
Morris, E. J.	Huntly	19
Mortimore, S.	Epping	29
Mosig, H. C.	Epping	22
Murfet, Mrs. S.	Huntly	21
Nankervis, L.	Mandurang	15
Nash, H. A.	Tullamarine	42
Nebel, Mrs. A. E.	Thomastown	36
Nelson, D.	Highton	58
Nestor Bros.	Wendouree	40
New, H. G.	Craigieburn	15
Nickols Bros.	Tandara	72
Noonan, J.	Sedgwick	50
Notman, J.	Reservoir	68
O'Dell, J. E.	Ballarat East	21
O'Donnell, P.	Wendouree	38
O'Gorman, A.	Craigieburn	67
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Trethewey, R. T.	Epsom	7
Trigg, Mrs. A.	Breakwater	20
Troutbeck, H. R.	Mickleham	47
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Twomey, A.	Greenvale	39
Underwood, V. D.	Alphington	13
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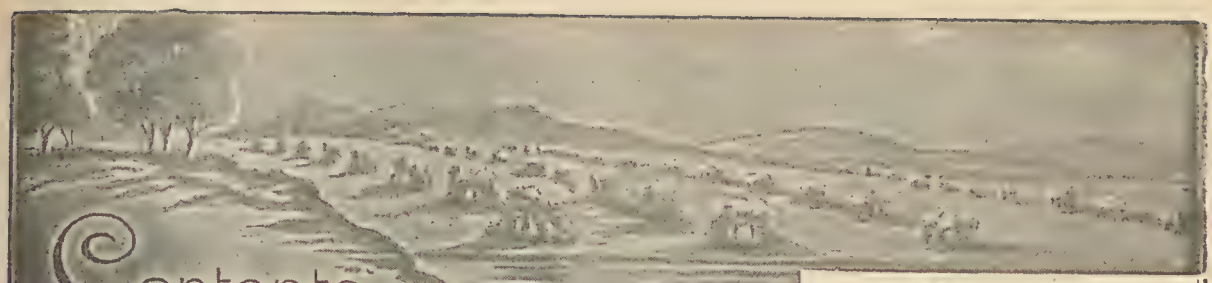
There are also 670 herds in which 12,874 head of cattle have passed one test, and may be considered therefore, to be in process of becoming tubercle-free herds.



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Issued by direction of the Hon. N. A. Martin, M.L.A., Minister of Agriculture.

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POSTAGE RATES

The postage required for this issue is:—To Australia and New Zealand, 1½d.; to United Kingdom, 2½d.; to United Kingdom via All-sea Route, 1½d.; to other British Possessions, 2½d.; to U.S.A. and Foreign Countries, 3½d.

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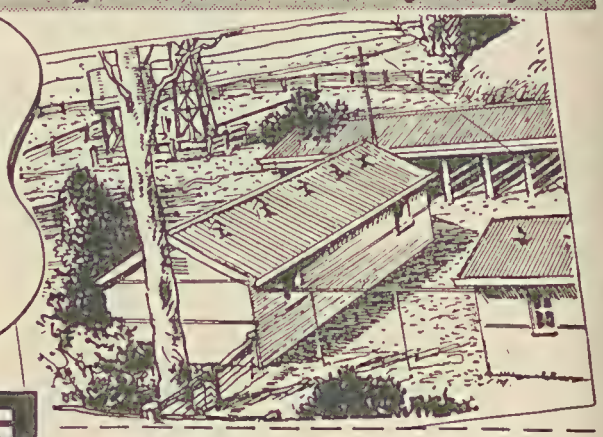

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LUCERNE in the MALLEE

By C. G. WEBB, M.Agr.Sc.,
Science Field Officer, Mallee Research Station, Walpeup

Pastures must be regarded as an important factor if the regeneration of Mallee lands is to be accomplished, but the choice of pasture species suitable for the conditions is severely limited.

Lucerne is foremost as a fodder plant and it is an encouraging fact that this valuable legume will persist in the Mallee provided that certain conditions are observed.

Preparation of the land for sowing by fallowing is regarded as a pre-requisite and the lucerne may be successfully established by sowing in autumn under cover of a wheat crop —2 lb. of seed per acre is sufficient.

Successful maintenance of lucerne demands regular manuring with superphosphate and regulated grazing to prevent persecution.

Mr. Webb's advice is based on his observations at the Mallee Research Station and the experiences of enterprising Mallee farmers who have tried lucerne with good results.

L. C. BARTELS, B.Agr.Sc., Senior Agrostologist.

IN the past, lucerne in the Mallee has been confined mainly to small areas in the vicinity of homesteads. These areas have been irrigated and utilized for cows and poultry. In recent years, however, there has been an increasing number of inquiries as to the possibility of sowing lucerne under normal Mallee field conditions. These questions have arisen largely from the need for diversification of Mallee farming practices and the necessity of supplying feed for an increased number of sheep.

The value of a perennial plant which will assist in holding the soil against erosion and at the same time provide an economic return, is also realized.

An area of "dryland" lucerne established at the Mallee Research Station in April, 1939, has produced very satisfactory results. Several Mallee farmers have also established good stands, but it should be understood that lucerne requiries good conditions for establishment, and farmers must be prepared for disappointment if seasonal conditions are unsatisfactory.

Preparation of the Soil

The most successful establishment of lucerne at Walpeup has been on fallowed land. Some farmers in South Australia prefer to sow lucerne into stubble with a disc implement; they claim that the straw provides shelter against high temperatures and blown sand, without the competition which a cover crop represents. Under Victorian conditions, however, it has been found that moisture is so much a limiting factor that, apart from exceptional seasons, the preparation of a good fallow is essential for a successful establishment. The land should be worked to a fine tilth at seeding time, but farmers are warned against working their ground too fine before summer erosion dangers have passed.

Varieties

Most of the lucerne seed on the market is produced under conditions where moisture is not a limiting factor—e.g., in irrigation and the higher rainfall districts. Plants grown under such conditions are not the most suitable for the Mallee, and it is wise when buying lucerne seed to specify a "dryland" strain. Several of these strains are available on the market and are produced mostly in the drier areas of South Australia.

Inoculation

In some Victorian districts it is necessary to inoculate the lucerne seed with a culture of suitable bacteria before sowing. This can be done by a simple process. In most of the

Mallee, however, the correct bacteria are present where medics such as Small Hairy Burr (*Medicago minima*) and Burr Medic (*M. denticulata*) are growing, and at Walpeup it has not been found necessary to inoculate lucerne seed before sowing.

Cover Crop

The main advantages claimed for growing a cover crop with young lucerne under Mallee conditions are:—

(*a*) The crop provides shelter for the lucerne seedlings from blown sand.

(*b*) The cover crop, when established early, is able to provide more competition against annual weeds, such as Wild Mustard (*Sisymbrium orientale*), than lucerne does in its early stages.

(*c*) The stubble left after the cover crop has been harvested provides a shelter for the young lucerne plants during the summer.

(*d*) The cover crop provides a financial return which considerably reduces the costs of establishment of the lucerne stand.

Both wheat and oats have been tested as cover crops at Walpeup, and the former has been the more successful. When oats are used it is advisable not to let them mature for grain, but to harvest them as silage or hay before they have exhausted the soil moisture.

With both wheat and oats it is advisable to sow at a lower rate of seeding than normal in order to provide less competition for the young lucerne plants. Sowings of 20 lb. per acre of wheat have been successful at Walpeup. If a farmer does not wish to reduce his rate of seeding to such a low level, he is advised to reduce it at least to 45 lb. per acre if his normal rate is 60 lb. per acre.

Rate of Seeding

It has been found at Walpeup that a thin stand of fairly large lucerne plants will provide as much feed as a thick stand of small plants where competition for soil moisture and nutrients is greater. It is the practice to sow lucerne at 2 lb. per acre at the Mallee Research Station, although 3 to 4 lb. per acre may be advisable where conditions of establishment are doubtful.

Manuring

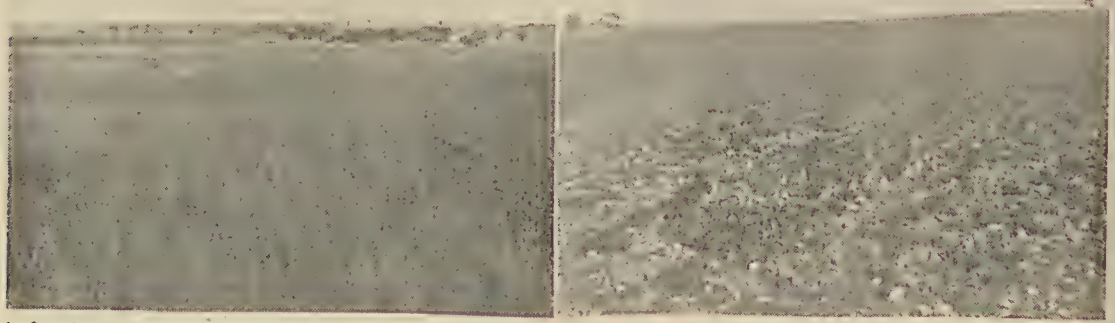
Under wartime conditions, when superphosphate is rationed, it is not possible to apply as much superphosphate to the lucerne stand as desired. Under normal conditions, however, it is recommended that more superphosphate than is usually applied to the cereal crop be provided for the young lucerne stand.

Time of Sowing

Lucerne has its optimum period of growth during the summer months, and is comparatively dormant during the winter. Lucerne, therefore, should be sown in April or May, so that it might become established before the cold weather and be in a condition for rapid growth at the onset of favourable conditions.

Method of Sowing

As lucerne has a very small seed it is desirable to sow it as shallowly as possible. This is not practicable with normal farm machinery, but can easily be accomplished



Left—A good growth of lucerne in a favourable Mallee season. Right—Lucerne successfully established on limestone Mallee Country near Antwerp.

Productive lucerne on loose sand.

with a seed attachment which deposits the seed on the surface of the soil. It may then be covered by brush or light harrows. As few Mallee farmers are in possession of such an attachment it is probable that the drill or combine would be used for sowing. If these implements are used it is most convenient to mix the seed with the superphosphate when sowing. The mixing should not take place too long before sowing, as prolonged contact with the "super." greatly reduces the germination percentage of the seed.

It is also advisable to sow the seed and superphosphate more shallowy than is normal with a cereal crop. Several farmers have adopted special methods of sowing lucerne with drills and combines. One farmer sows his cereal seed at the normal depth without any superphosphate and then goes over the paddock again and sows the lucerne and superphosphate at a shallower depth. If the two sowings are made at right angles there is less competition between the cereal and the lucerne, and the scouring effect of wind between the rows is diminished. Another farmer sows the cereal at the normal depth with half the amount of superphosphate and then broadcasts the lucerne seed and remainder of the superphosphate on the ground with the tubes hanging loose from the drill.

Management after Establishment

Once established, the lucerne stand will survive for many years under Mallee conditions if managed with care. As it is often the only green growth during the summer months there is a big temptation for the farmer to overgraze it and considerably reduce its life. Rabbits and hares also will travel long distances to eat the green shoots, and if these vermin cannot be kept away from the stand, the farmer is strongly advised to consider whether it is advisable to postpone his sowing until such vermin are completely under control.

Summary

It is possible to establish lucerne under field conditions in the Mallee, but in view of the unreliable climate farmers must be prepared for disappointment in unfavourable years.

The most successful establishment of lucerne at the Mallee Research Station, Walpeup, has been on a well-worked fallow. Farmers are, however, warned against working their fallows to too fine a tilth until the maximum soil erosion dangers have passed.

When buying seed, farmers are advised to specify a "dryland" strain. It has not been found necessary to inoculate lucerne seed in areas where natural Medics are growing.

It is considered advisable to sow a cover crop of wheat or oats with the lucerne and to adopt a lighter rate of seeding than normal with the cereal.

It is the practice to sow lucerne at the rate of 2 lb. per acre at Walpeup.

Although it may be impossible to do so under wartime conditions, it is advisable to

increase the dressing of superphosphate above the normal rate used with cereals.

As lucerne is dormant in the winter months, it is advisable to sow in April or May so that it will be able to take advantage of more favourable conditions in the spring.

Farmers are advised to sow lucerne seed as shallowly as possible. If the seed is to be mixed with superphosphate, mixing should be done as near to the actual time of sowing as possible.

Lucerne established at Walpeup under cover of a wheat crop.

As overgrazing by farm animals and vermin, particularly in a dry season, is fatal to lucerne, farmers are warned to take every precaution against these dangers. Farmers must give serious consideration to their ability to control grazing when determining the practicability of sowing lucerne on their properties.

Accredited Brucellosis-free Herds (Swine)

The following herds of pigs have been accredited as free of swine brucellosis (contagious abortion of pigs) by the Department of Agriculture.

An accredited brucellosis-free herd of pigs is one in which all animals therein have been subjected to two successive blood tests for brucellosis with negative results at intervals prescribed by the Chief Veterinary Inspector of the Department.

In order to remain accredited, a semi-annual or annual re-test (as determined by the Chief Veterinary Inspector) of all animals in the herd shall be conducted. If at a re-test any animal fails to give a negative reaction to the test, the herd shall not be declared brucellosis-free again until two tests of the complete herd have been carried out with negative results.

Full particulars of the Accredited Swine Brucellosis-free Herd Scheme and application forms may be obtained from the Chief Veterinary Inspector, Department of Agriculture, Melbourne, C.2.

Name.	Address.	Name.	Address.
Abrahams, L. J. ..	Red Hill South	Horn, L. A.	Leongatha North
Beechy, K.	Pomborneit	Longerenong College ..	Dooen
Bidgood Bros.	Staghorn Flat	Noble, T. M., and Sons ..	Maffra
Bodey, A. A.	"Bonnyview," Dooen	Northcote Children's Farm	Bacchus Marsh
Bright, George H. ..	Dumbalk	Pietsch, R. E.	Katyil
Castle, L. H.	Clarinda	Rintoul, J. T. C. ..	Glengarry
Critten, H. S.	Dumbalk	Roy, W. A.	Morrell's Hill, via Boolarra
Dookie Agricultural College	Dookie	State Experiment Farm ..	Rutherglen
Doornbusch, John L. ..	"Starpark," Nhill	Trenery and Soderlund ..	"Promview," Foster
Ellwood, A. H. ..	Paschendaele	Trigg, A. J.	Bungaree
Fairchild and Clutterbuck	Tinamba	Trigg, N. H.	Bullarook
Hamblin, A. T., and Sons	Toolleen	Tweddle, J. T.	"Winlaton," Shepparton
Harrison, C. T... ...	"Eastside" Stud, Pomborneit	Warry, A., and Sons ..	Delburn
Hawtin, I. E. and F. ..	"Rossmoyne," Colac	Whelpton, B.	Whittlesea North
Haywood, Dr. A. R. ..	Hastings	White, G. W.	Boolarra South

PIG BREEDING

. . *Market Requirements*

By L. A. DOWNEY, H.D.A., Pig Expert

Pigs are used primarily to provide meat for man. Pig raisers aim to produce the kinds of pig meat which are most sought after, and to get the greatest possible return from their enterprise.

As the materials available to them vary considerably their success depends on the exercise of considerable skill in the selection and use of the animals, foods and the other things which go to make pig meat. That skill can be developed by practice and observation, and by study of proved facts as set out in the following article.

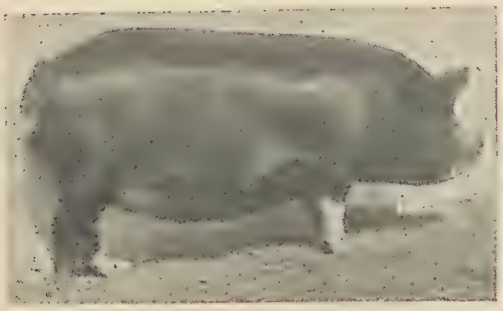
SUCCESSFUL pig production requires the skilful manipulation of environment and heredity. Environment is mainly a matter of quantity and quality of the food. The effects of heredity and environment are so inter-related that each must be considered in relation to the other.

Pigs which may thrive under one particular environment may not give satisfaction in another. It is futile to improve the animals' inherent capacity for growth and reproduction without a corresponding improvement in their environment.

Modern, symmetrical and highly productive pigs were developed by taming wild pigs and selecting and crossing their progeny to suit the environment of domestic stock-raising. The environment of domestic pigs includes a better and more easily obtainable diet than was generally available to their wild ancestors. It is also freer from natural enemies and in consequence modern pigs are not so well built for defence and speed, but more for rapid growth and reproduction.

Domestic pigs are divided into groups known as breeds. The pigs within each breed have more or less common ancestry and colour, but may vary considerably in conformation and productivity. Therefore, it is important to give more consideration to the selection of individual pigs than to the choice of a breed.

YOUNG SOWS TYPICAL OF THEIR BREED



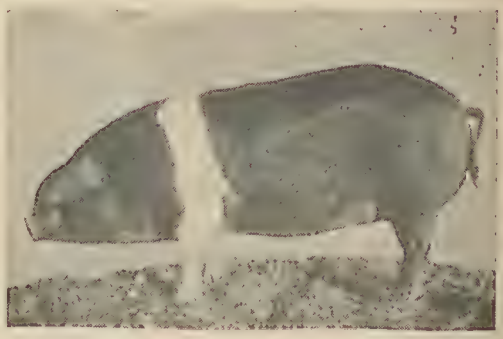
Berkshire.

Tamworth.

Middle White

Large White

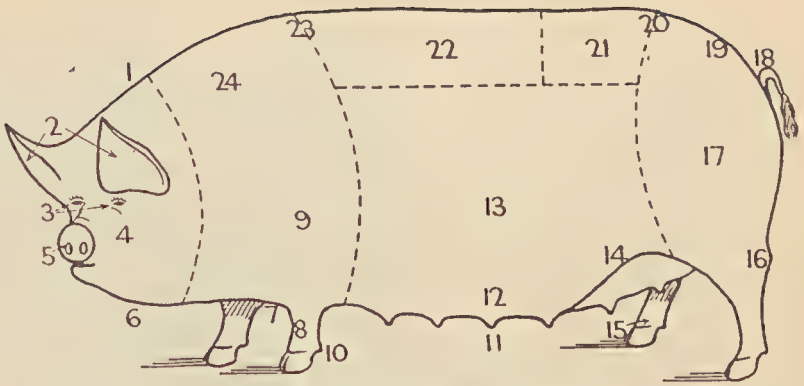
Large Black.



Wessex Saddleback.

In the selection of breeding stock, records of performance secured by progeny testing should be used whenever they are available. In addition to such records, and in their absence, judging on appearance is necessary. Such judging is based on a mental picture of a standard and the comparison of the pig to be judged with that standard.

Breeding stock should have character, full and balanced physical development, at least twelve well-placed and well-developed teats. Families in which hernia and other inherited defects occur should be avoided.



PARTS OF A PIG—DESCRIPTION OF DIAGRAM.

1. Head.
2. Ears.
3. Eyes.
4. Face.
5. Snout.
6. Jowl.
7. Chest.
8. Knee.
9. Shoulder.
10. Dewclaw.
11. Teat.
12. Belly.
13. Side.
14. Flank.
15. Foot.
16. Hock.
17. Ham.
18. Tail.
19. Rump.
20. Hindquarters.
21. Loin.
22. Back.
23. Forequarters.
24. Neck.

Some errors can be avoided if pigs required for future breeding are selected when they are of the weight at which their kind is usually marketed.

Select baconer breeding pigs when they are at baconer weights.

The first stage of progeny testing is the recording of the total weight of the litter when weaned. This reflects the prolificacy and milking capacity of the brood sow.

The extent of variation in litter weights is shown in the following summary of official records of 51 litters raised on fourteen Victorian farms, at the age of 56 days.

TABLE 1.—CLASSIFICATION OF LITTERS INTO WEIGHT GROUPS AT 56 DAYS OLD.

—	Number of Litters.	Average Weight of Litters.	Average Number of Pigs per Litter.	Average Weight per Pig.	Breeding.
		lb.		lb.	
Under 200 lb. ..	7	166·1	6·2	26·3	3 Berkshire 1 Mid. White 3 Large White
200 lb. to 250 lb. ..	5	207·2	6·6	31·3	1 Mid. White 4 Large White
251 lb. to 300 lb. ..	9	277·1	8·6	32·0	1 Mid. White. 1 Tam. 1 Large White x Mid. White 1 Wessex x Large White 5 Large White
301 lb. to 350 lb. ..	8	331·8	9·5	34·9	2 Berkshire 6 Large White
351 lb. to 400 lb. ..	12	383·2	9·6	39·6	1 Large White x Berkshire 1 Large White x Tam. 1 Tam. 9 Large White
Over 400 lb.	10	428·6	11·0	38·9	1 Berkshire 9 Large White
All Litters	51	318·4	8·9	35·5	

Let the Goals be

Two litters a year per sow; 3 lb. pigs at birth; 250 lb. litters at 8 weeks old, and 200 lb. live weight baconers at 200 days old.

Small Litters Have a High Overhead Cost per Pig.

To avoid small litters :—

(1) Select prospective brood sows on their parents' production records.

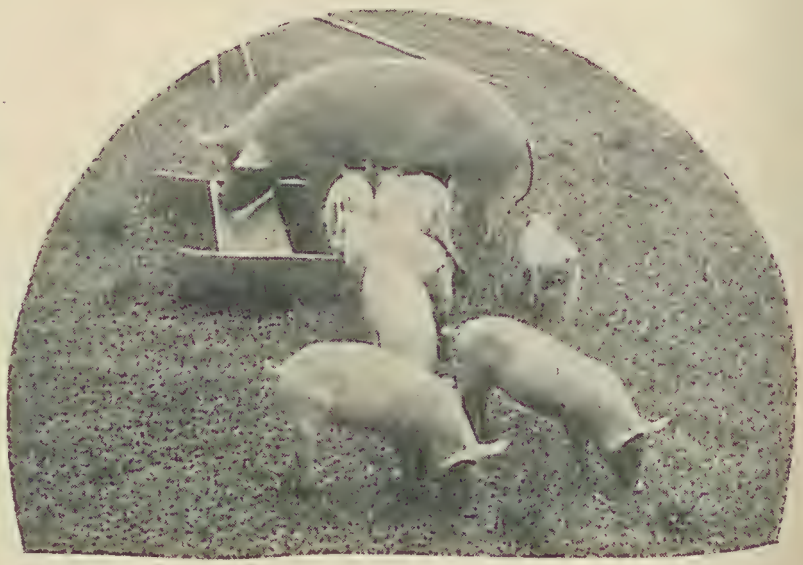
(2) Feed them an adequate and complete diet at all times.

(3) Don't keep brood sows in the herd until they are too old. There is no rule on the length of time to keep them, but most sows are on the down grade as mothers after they have reared five litters. Usually first signs of deterioration occur in the udders.

By weighing litters at 8 weeks old, farmers can determine when each sow should be culled.

Having been culled from the breeding herd, the sow is fattened and sold for meat, her market value usually being at least equal to the cost of her replacement by a young sow ready to mate.

Sows in low condition after having weaned their litters should be fed to improve their condition quickly just before mating time. They should then be kept improving in condition until they are fat, but not too fat, and kept in that condition until farrowing time, which is about 112 days after conception.



The litter of twelve illustrated weighed 526 lb. at 8 weeks old, which is more than double the weight of most litters at this age. Such performances are achieved by selection based on records of production, and by providing a favorable environment. It pays to weigh at 8 weeks old.

Progeny testing involving the litter weight at weaning, growth rate to baconer weight and carcass quality is shown in the accompanying illustration.

This pig and the carcass were two members of a litter of twelve which weighed 392 lb. when 8 weeks old.

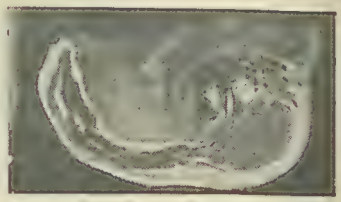
The average fasted weight of the two when 168 days old was 210 lb. alive.

The loin cut from the carcass shows the desired proportions of fat and lean.

Thus, in this litter were combined three very desirable features—prolificacy, rapid growth, and good carcass quality. This progeny test showed the worth of the parent stock.

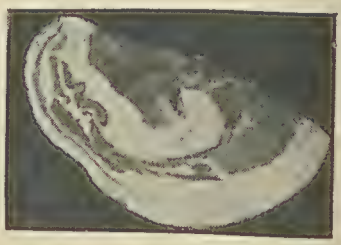
Pigs should be marketed when in the desired condition rather than at any particular weight

A fleshy baconer with a relatively long body.



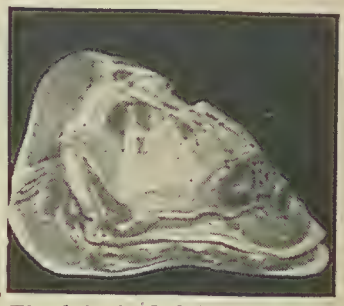
The loin of the fleshy baconer has an abundance of lean meat, and a relatively small amount of fat on the back and in the streak.

A fat baconer with a short, thick body.



The loin of the fat baconer has a high proportion of fat.

An unfinished pig.



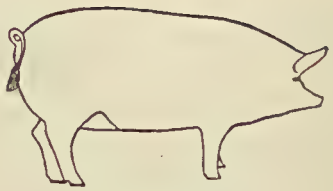
The loin is deficient in back fat and streak fat.

HOW THE PIG DEVELOPS

MATURE SOWS

Small Type

Medium Type

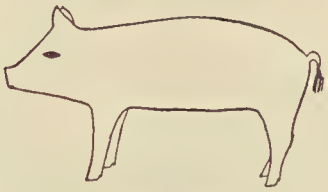


Large Type

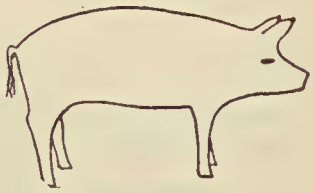
THEIR PROGENY

AS WEANERS

Plump and Attractive

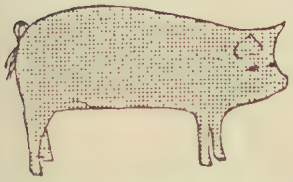


Rangy



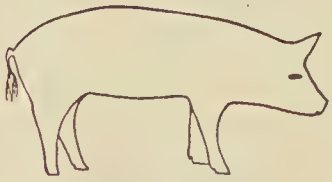
Very Rangy

AT PORKER WEIGHT



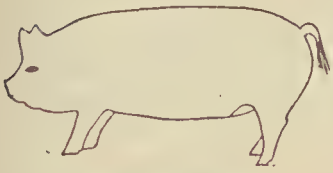
"Finished"—Fit for Pork Trade

In Store Condition

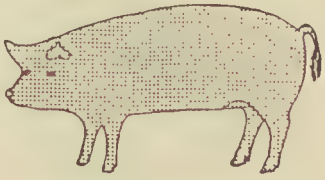


A Rangy Store

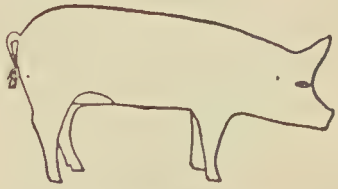
AT LIGHT BACON WEIGHT



"Overdone"—Too Fat

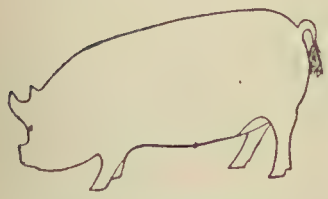


"Finished"—Fit for Light Bacon Trade

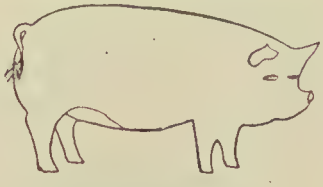


Rangy and Thin

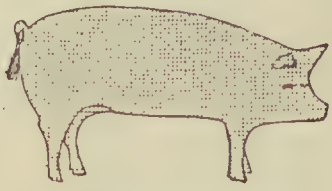
AT HEAVY BACON WEIGHT



Much Too Thick and Fat



Overfat and Thick

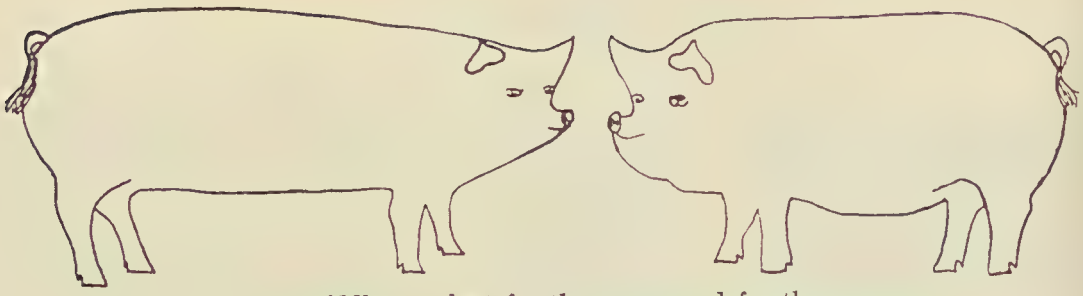


"Finished"—Fit for Heavy Bacon Trade

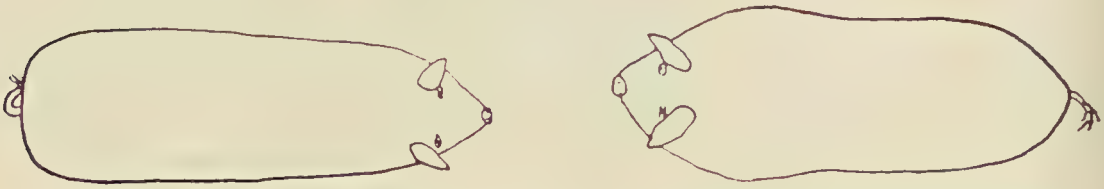
The growth of pigs to the stage when their carcass has the desired proportions of bone, muscle, and fat, is influenced by their inherent type, and by their environment, particularly their food.

The drawings show the stages of development through which pigs of three different inherent types pass when they are fed a full diet.

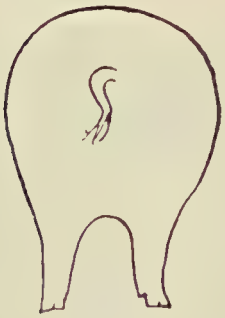
Desirable Features *Undesirable Features*



Pigs with long middles are best for the grower and for the consumer.



Shoulder meat is worth less per lb. than ham or leg of pork, so that pigs with light shoulders are preferred.



For good carving, hams and pork legs should be thick with an abundance of meat.

To be active and a "good doer" the pig should have its legs set well on the "outside" of its body.

Hind legs too, should be well apart at the hocks.

Purebreds or Crossbreds?

Planned cross breeding is often resorted to as a means of getting the required vigor and conformation to suit a particular purpose.

Indiscriminate cross-breeding should be avoided because it results in loss of uniformity.

At least one of the two pigs of a cross-mating should be pure bred.

When pure-bred pigs like these, possessing all the desired features, can be obtained by selection within breeds there is no need to cross.

Pure breeding designed to "fix" the inherited characters is essential to the pig industry, and pure-breds are the foundation of crosses.

Breeding or Fattening.

Under most circumstances it is more profitable for each farmer to breed the pigs he intends to fatten than to buy stores at the pig market, even though breeding requires the provision of more accommodation and the exercise of more skill.

Purchased store pigs are usually bought on a dear market and sold on a low market. They are not always the type the buyer wants, and frequently they are a source of infection to the piggery.

The Boar.

The sire is the most important individual of the herd. He should be well chosen and well cared for. He will be ready for service when about 8 months old if well grown, and will be most productive over a long period if kept apart from the sows except when used for controlled service.

When boars reach the age of the one illustrated on the right they should have their tusks cut off, otherwise they are a source of danger to other pigs, and to attendants.

Restraint is obtained by a rope noose round the upper jaw and secured to a firm post. The tusks can be removed by bolt cutters or a hack saw.

Age to Mate Sows.

The gilts illustrated, being 8 months old, about 250 lb. live weight, and in good condition, are ready to mate. One service on the first day of oestrus, and one on the second day, is a recommended practice.

REGISTRATION OF STALLIONS

Twenty-Fourth Annual Report

By R. J. deC. TALBOT, B.V.Sc., Chief Veterinary Inspector

IN view of the shortage of labour on most farms since the commencement of war and the dry season during the past twelve months, it may be considered as satisfactory that 912 stallions were registered under the Horse Breeding Act for the year 1943-44.

In any post-war reconstruction programme of rural industry, horses will undoubtedly play an important part, and be used more extensively than at present, as it will be some time after the war before manufacturers are able to meet the demand for mechanical power-units for farms.

Prices for draught stock have improved during the past twelve months, and it is anticipated that they will improve still further, which should stimulate greater interest in stud breeding.

During the year 1943-44, as abovementioned, 912 stallions, comprising 500 draught, 239 light, and 173 pony stallions were registered under the Act. The number of stallions examined by the Veterinary Staff, with a view to registration, was 90 draughts, 75 lights, and 41 ponies, a total of 206. Of these 15 (7.26 per cent.) were refused registration because of unsoundness, and 25 (12.13 per cent.) because they were considered to be below a reasonable standard of type and conformation. 166 stallions were passed for registration.

The total percentage of rejections (19.39 per cent.) was higher that the previous year, but in view of the comparatively small number of stallions examined, the figure may not be signficant, and is lower than the average since the inception of the Act.

Bonus for Foals

With a view to encouraging the breeding of the best type of draught stock, the Government in 1941 decided that a bonus of £2 would be

Horses are doing their part in the war effort by replacing motor transport.

paid to the owner of every foal the progeny of a registered draught stallion and a mare approved by the Chief Veterinary Inspector. To date £6,850 has been paid in respect of 3,425 foals.

The Bonus Scheme should, undoubtedly, stimulate draught-horse breeding, and intending applicants are reminded that all applications must reach the Department before the 30th June next.

Examination of Mares

Breeders are reminded that, under a voluntary scheme, stud book mares may be submitted for examination for soundness. A fee of £1 is charged for the examination, and certificates are issued for three-year-olds and four-year-olds, and life certificates for mares five years and over. In the past, many owners have availed themselves of the opportunity of having their mares examined, and it is hoped that during the coming season all stud breeders will present at least some of their mares for examination.

LIST OF UNREGISTERED STALLIONS RETAINED BY OWNERS FOR USE WITH THEIR OWN MARES.

Under the provisions of the Horse Breeding Act the owner of any stallion, the registration of which has been refused, may, on payment of a fee of £1 per annum, and notification to the Chief Veterinary Inspector, retain such stallion for breeding purposes with his own mares only.

Name.	*Age and Class.	Owner and Address.
Unnamed	A. L.	M. Cole, Kooreh
Alto Bells	A. P.	J. Barty, Redesdale
Baron Bold	A. D.	Mrs. D. A. Daly, Detpa
Benambra	A. D.	Nankervis Bros., Corryong
Ben Bowyang	A. D.	S. J. Wilson, Nar Nar Goon
Black Baron	A. D.	A. E. Tucker, Mitchell's Hill
Black Prince	A. P.	W. K. Thomas, Mt. Cole Creek
Black Star	A. L.	D. Madill, Koyuga South
Bonnie Prince	4 D.	J. Moore, Worri Yallock
Boyeo's Choice	3 D.	A. A. Cramer, Boyeo
Bravia	A. T.	E. J. Wright, Flynn
Clan MacKenzie	A. D.	J. Purdie, Wunghnu
Clyde	A. D.	G. Thomson, Kilcunda
Danny Boy	A. L.	W. Meagher, Danyo
Devon Point	5 L.	J. Manifold, Weerite
Drummer	A. D.	F. Bird, junr., Yarram
Duke Fort	3 D.	G. E. Casey, Shepparton
Ethaldale Scotson	A. D.	H. H. T. Kramer, Lawloit
Flash	A. P.	A. F. Sanders, Sale
Fifeness Flash Baron	A. D.	H. L. Treasure, Stratford
Glen McBride	A. D.	H. Jager, Swan Hill
John McElwyn	A. P.	D. Bamford, Beeac
Kawaran Liston Craig	A. D.	V. O. Frost, Netherby
Keayang	A. D.	J. Blain, Dixie
Lee Wah	5 L.	Mrs. M. J. Forster, Pyramid
Lord Victor	A. D.	J. Montgomery, Milawa
Majestic Knight	A. P.	Miss G. Small, Ferntree Gully
Manya Thrill	A. L.	E. W. Wheeler, Manya
Merry Prince	3 D.	W. A. J. Pearse, Nyah West
Model	A. D.	G. B. Wilson, Machin's Loose Bag
Money King	6 L.	J. A. Bowland, Leitchville
Noble	A. D.	E. Crowe, Tatong
Peter	A. D.	C. A. Deckert, Boinka
Pinevale Famous	3 D.	F. Redman, Broomfield
Prince	A. D.	A. H. Lawson, Bairnsdale
Prince	A. D.	F. Justin, Camperdown
Punch	A. D.	W. Earl, Woodside
Pyjamas	A. P.	Boyd Bros., Koroit
Rob Roy	A. P.	Miss E. A. Small, Hawthorn
Royal Prince	A. D.	J. H. Crawford, Victoria Valley
Scotland's Duke	A. D.	H. F. Quick, Brim
Sordino	A. T.	L. Matthews, Benambra
Sunset Trail	A. T.	Yarraberb Pty. Ltd., Raywood
Surprise Power	A. P.	W. J. Jensen, Morwell
Waldaira's King Knight	A. D.	Boyd Bros., Koroit
Wal Marshall	3 D.	H. H. J. Emonson, Berriwillock
Warrangee Oswald	A. D.	G. Lord, Eskdale
Whisky	3 P.	J. H. Rogers, Traralgon
Worawingeth Allenby	A. D.	W. T. Rowe, Wallinduc

* NOTE.—Age in years. A., aged; D., draught; L., light; P., pony; T., thoroughbred.

SUMMARY OF EXAMINATIONS, 1943–44.

	Draught.		Light.		Pony.		Total.	
	Examined. 90.	Certificated. 64.	Examined. 75.	Certificated. 64.	Examined. 41.	Certificated. 38.	Examined. 206.	Certificated. 166.
	Rejected.	Percentage Rejected.	Rejected.	Percentage Rejected.	Rejected.	Percentage Rejected.	Rejected.	Percentage Rejected.
Bone Spavin	..	..	1	1·3	..	..	1	·48
Bog Spavin	2	2·2	..	..	..	..	2	·96
Chorea (Nervy)	..	..	..	..	..	..	..	..
Curb	..	..	..	..	..	..	..	..
Ringbone	..	..	..	..	..	..	..	..
Sidebone	12	13·3	..	..	..	..	12	5·82
Stringhalt	..	..	..	..	..	..	..	..
Thoroughpin	..	..	..	..	..	..	..	..
Through unsoundness	14	15·5	1	1·3	..	..	15	7·26
Through disapproval	12	13·3	10	13·3	3	7·31	25	12·13
Total	26	28·8	11	14·6	3	7·31	40	19·39

SUMMARY OF EXAMINATIONS, 1942–43.

	Draught.		Light.		Pony.		Total.	
	Examined. 93.	Certificated. 82.	Examined. 46.	Certificated. 40.	Examined. 41.	Certificated. 38.	Examined. 180.	Certificated. 160.
	Rejected.	Percentage Rejected.	Rejected.	Percentage Rejected.	Rejected.	Percentage Rejected.	Rejected.	Percentage Rejected.
Bog Spavin	..	..	..	..	..	..	..	..
Bone Spavin	..	..	..	..	..	..	..	..
Chorea (Nervy)	..	..	..	..	..	..	..	..
Curb	..	..	1	2·173	..	..	1	·6
Cataract	..	..	1	2·173	..	..	1	·6
Ringbone	1	1·075	..	..	..	..	1	·6
Sidebone	2	2·150	1	2·173	..	..	3	1·6
Stringhalt	..	..	..	..	..	..	..	..
Thoroughpin	..	..	..	..	..	..	..	..
Through Unsoundness	3	3·225	3	6·519	..	..	6	3·4
Through disapproval	8	8·602	3	6·519	3	7·317	14	7·7
Total	11	11·827	6	13·038	3	7·317	20	11·1

Two-year-old Colts

In 1939 the Horse Breeding Act was amended to provide for the registration of two-year-old colts whose owners desired to give them some stud service. The amendment provides that owners must make application for registration on the prescribed form, and the application must be accompanied by a fee of £1. The colt must be submitted for examination at a scheduled parade, and, if passed, will be registered as a colt for one year. During the season 1943-44, fourteen colts were submitted for examination, and were registered.

Amendment of Regulations Regarding Fees Payable

In January, 1943, the Regulations of the Horse Breeding Act were amended to provide that the total annual fee payable in respect of a stallion sixteen years old or over sixteen years

[*continued on page* 211.

War Agricultural Committee Notes

Compiled by THE CENTRAL EXECUTIVE

Machinery Groups

FROM the beginning of the war, Australia's major problem has been shortage of manpower. Just as in the early years of the war it was necessary to tap all sources to obtain the necessary numbers of men and women for the Army and Munitions programme, so now we are faced with the problem of getting manpower into food production.

Despite all the endeavours to "protect" present rural workers, to direct back to the land those who worked there prior to the war, and to supplement these with prisoners of war, Women's Land Army and Rural Pools, shortage of manpower is still the major limiting factor in our food programme.

This, however, is by no means a new problem to Australia, and the rural industry in this country has been faced continually with devising means of overcoming this shortage. Mechanization of the means of production has been one very effective method and the Australian wheat industry has led the world in producing the combine, the stripper and the header-harvester. Producers of other crops such as vegetables and potatoes in the past have not felt the same need for mechanization but with the present necessity of expanding production of these foods it is obvious that considerable mechanization will have to be undertaken.

With this end in view, the Government has arranged within the last year to increase production of agricultural machinery and where necessary to import tractors and implements from America. Tractors, special vegetable inter-row cultivators, planters, diggers and harvesters are now beginning to come into production and will be available in increasing quantities during the next six months.

Much of this machinery will be expensive and, therefore, will have to be used to the maximum extent over fairly large areas. Moreover, much of it will be new to Australian farmers and will be best handled by one experienced man. Small farmers would, therefore, have difficulty individually in purchasing and utlizing such implements.

To meet this situation, it has been decided that the State Department of Agriculture will make available such machinery to small groups of farmers on a rental basis. These pools should prove of inestimable value in removing difficulties particularly for smaller farmers who would be unwise to over-capitalize by investing in large-scale equipment but who would, if possible, willingly avail themselves of its time and labour-saving possibilities.

The provision of machinery under this scheme should greatly assist primary production, especially of those types most important from the wartime food production point of view.

Of these forms of production probably the most important today is the production of vegetables, which are required in large quantities for service and civilian needs both at home and overseas. These products are required for use as fresh vegetables, for canning and dehydration, and to ensure continuity of supply, the Government has let contracts to growers for the bulk of the total requirements. Potatoes and onions are just as important as other vegetables and their production must be encouraged to meet the increasing demand for these commodities.

Machinery for the conservation of meadow and lucerne hay also will be of considerable assistance to the dairying, fat lamb and cattle raising industries, and to further assist dairy-farmers, who are short of manpower, machinery under this scheme will be available for the growing of fodder crops.

Encouragement of the production of canning and dried fruits industries should also result from the provision of equipment for general cultural purposes and for the control of orchard pests.

The machinery will comprise tractors of various types together with special cultivating, seeding and harvesting implements, potato diggers and planters, power mowers and hay-baling machinery, rotary hoes, power-spray and dusting outfits and seed-cleaning machinery. Certain of these implements are experimental or newly developed types, the production or importation of which has been specifically sponsored by the Commonwealth Government. These will be subject to further trial under practical conditions before their general distribution is undertaken.

To assure the fullest use of the machinery, it will be made available to the farming community by lease to farmers (either as individuals or in groups) or to contractors. Every

encouragement will also be given to corporate companies, such as canning, dehydrating and freezing companies or butter factories, to lease equipment suitable for their particular type of activity.

Groups of machines may be placed in the hands of competent parties under a lease agreement with the Victorian Minister of Agriculture, to service a definite number of farms in a given area. Such a machinery pool would be kept under the nominal control of the District War Agricultural Committee which would act as the local representative of the lessor, and arbitrate in any local difficulties which may arise regarding such matters as priority of service between farmers. The co-operation of food processing factories will be welcomed by the War Agricultural Committee in establishing pools to serve a definite number of their suppliers or shareholders under this arrangement.

Farmers desiring the use of Group Machinery should form themselves into groups of a suitable size in order that they may place before the District War Agricultural Committee specific proposals for the establishment of machinery groups in their districts. Each group will nominate an individual farmer or contractor as their representative to whom the machinery will be leased and he will be responsible for its efficient operation.

The individual or corporate company to whom Group Machinery is leased will be responsible for the payment of the rental for the machines and for their proper maintenance and repair. The machinery will be operated on a contract basis by the lessee to service all farmers within the group. The contract rates will be fixed by the Department of Agriculture and will, as far as possible, conform with the rates ruling in the district.

Machinery will also be made available to farmers and corporate bodies by direct sale. Each application for direct purchase of specialized equipment will be sponsored by the War Agricultural Committee which will secure an undertaking from the purchaser that the machines will be utilized to service an area of priority crops sufficient to keep them fully employed throughout the season.

This scheme should do much to ease the difficulties at present facing primary producers and should enable the production of vital foodstuffs to be increased. It is suggested that farmers talk this plan over with their neighbours and submit their ideas to the Local War Agricultural Committee.

REGISTRATION OF STALLIONS—*continued from page 209.*

is £1 1s., instead of £3. The annual fee payable for stallions fifteen years old and under remains at £3.

Parades for the Coming Season

Owing to the petrol restrictions, a schedule of stallion parades cannot be arranged for this season. Where possible, arrangements will be made to examine stallions at centres most convenient to those owners from whom applications have been received. Applicants should state which main town would be most suitable for them to present their stallions for examination, and they will, in due course, be advised of date, time, and place arranged for the examination.

Provided owners forward their applications by 1st July, as is required, it is felt that, by such an arrangement every stallion will be examined before the commencement of the breeding season.

Applications for registration must be made on the prescribed forms before the 1st July, and must be accompanied by a fee of £3 (£1 for registration and £2 for compensation fee) in respect of stallions fifteen years of age and under, and a fee of £1 1s. in respect of stallions sixteen years or over sixteen years. The necessary forms may be obtained from the Chief Veterinary Inspector, Live Stock Division, Department of Agriculture, Melbourne, C.2.

Change of ownership must be notified without delay, in order that certificates of registration may be endorsed accordingly. Registration expires within 30 days of change of ownership, unless the required notice is given.

VITAMIN DEFICIENCY DISEASES IN POULTRY

Contributed by the Veterinary Research Institute, University of Melbourne.

Avitaminosis A—Greenfeed Deficiency Disease

VITAMINS are chemical substances which are essential for the normal development and maintenance of the animal body, and although only minute amounts are necessary, their continued absence from the diet may result in actual disease. The diseases which develop when the diet is deficient in vitamins are known as avitaminoses, and in poultry the commonest is avitaminosis A (also called green-food deficiency disease, and nutritional roup) due to a food intake containing insufficient vitamin A for the maintenance of health.

Vitamin A is necessary for growth, egg production and reproduction; it also fortifies the upper respiratory passages against infection. When a diet containing no vitamin A is fed to poultry, the birds become unthrifty; they show a discharge from the nostrils, and may develop swellings in the eyes and facial sinuses caused by the accumulation of a thick gelatinous or cheesy exudate. Similar cheesy deposits may occur in the mouth, and in advanced cases, whitish pustules form in the mucous membrane lining the oesophagus or gullet. A bird suffering from avitaminosis A shows signs which are difficult to distinguish from those accompanying infectious laryngotracheitis, fowl pox, and infectious catarrh. Although the diet may not be totally deficient in vitamin A, the amount present may be too small for normal requirements, resulting in a slow growth rate, lowered egg production and poor fertility and "hatchability."

Leafy green vegetables such as spinach and silver beet, young green grass and cereal crops, and carrots and yellow maize contain vitamin A; the inclusion of adequate amounts of succulent green feed in the ration will supply the necessary requirements of this vitamin. When green crops or other vegetable sources of vitamin A are not available, substitutes are necessary. Cod liver oil, and oils prepared from the livers of certain sharks and other fishes have a high vitamin A content, and during the autumn, and at other times when green feed is scarce or of poor quality, the ration should include one of the vitamin A supplements. Care should be taken to purchase only the fish oils which have a guaranteed vitamin A content.

Rickets

Vitamin D deficiency is accompanied by imperfect bone development, and in chickens leads to rickets. Vitamin D is found in the body when birds are exposed to the ultra violet rays of direct sunlight, and under normal conditions a vitamin D deficiency should not occur in Australia. Trouble is frequently experienced, however, in young chickens reared in a brooder where they are excluded from sunshine; thus unless precautions are taken, rickets is likely to develop in battery brooders. Chickens with rickets usually show some abnormality of posture and gait, and varying degrees of leg weakness may be shown. The beak becomes soft, growth is retarded, and death may take place in a short time after the signs are first noticed.

The most valuable preventive measure is exposure to direct sunlight, but when this is not practicable, cod liver oil with an adequate content of vitamin D should be provided. It should be noted that the vitamin A supplements, such as shark liver oil, are not suitable for the prevention of rickets, as their vitamin D content is negligible.

Live Stock Notes

Compiled by
A. C. T. HEWITT, M.Agr.Sc.,
Live Stock Science Officer

Wheat as a Stock Food

THE large reserves of wheat held by the Allied nations are gradually disappearing as the result of the increased uses of wheat for stock feeding and industrial purposes. Record quantities of wheat are being used for feeding to poultry, pigs, sheep, dairy cattle, horses, and even dogs, in Victoria, where it is found to be the cheapest and most easily procured food. However, many dairyfarmers are wary about feeding ground wheat to their cows, but, when judiciously fed, there is little danger of ill-effects resulting from the liberal use of ground wheat in the ration.

Many dairyfarmers have fed ground wheat to their cows for long periods, but in Victoria no records have been kept of the total quantities fed. At the Ohio (U.S.) Experiment Station, two cows which were under observation received wheat as the sole grain for over a year, and did quite well. One cow ate over two tons of wheat, and the other more than one and a half tons, equivalent to 12½ and 9¼ lb. for each cow per day respectively throughout the year.

The advantages and methods of feeding wheat to stock have been published by the Department of Agriculture in a pamphlet entitled "Wheat as a Solution to the Stock Feeding Problem." This pamphlet is available free of cost on application to the Department of Agriculture, Melbourne, C.2.

In this pamphlet, however, it is stated that the advance payment for an 11-ton truck of wheat would be £79 19s., whereas the advance payment to the Australian Wheat Board on an 11-ton truck is £70 19s.

Causes of Small Pig Litters

Many farmers attribute the number of pigs born in litters entirely to the influence of the sire. There is evidence that the boar does affect the litter size, but he is only one of several factors which help to determine the number of pigs born.

Both the boar and the sow carry inherited factors affecting fertility, and it is good practice to select breeding pigs on their production performances or if they are untried stock, on those of their parents and brothers and sisters.

Using boars and sows which have inherited the capacity for high fertility will not alone ensure their production of large litters. It is also necessary to provide these boars and sows with an environment which will enable them to produce to the limit of that capacity. Environment includes their food, and in most

cases of low fertility some deficiency in quantity or quality in the diet is the cause.

Breeding boars should be given sufficient food to keep them in good fleshy condition. Sows should be fed sufficient food after weaning their litters to bring them quickly into good fleshy condition, and then their diet should be restricted so as to keep them in good condition till they farrow without developing excessive fatness.

Care should be taken to see that breeding pigs always have in their diet either separated milk, buttermilk, meat or meatmeal, and pasture or cut green fodder or legume hay or chaff, together with the necessary cereal grain or meal, or their substitutes, to make up the required bulk. When less than two gallons of milk per pig daily are fed in a diet comprised largely of grain, a lime supplement should be fed as a mixture of 4 parts ground limestone and 1 part salt, used at the rate of 1 oz. daily to each breeding boar or pregnant sow, or this mixture of lime and salt may be self-fed from a sheltered trough.

Boars may be rendered temporarily infertile through excessive work, in which case a rest from service for a month, accompanied by good feeding, brings improvement.

By keeping the boar away from sows, except when they are brought toegether for one controlled service, the productivity of the boar is fully maintained over a long period.

[L. A. Downey, H.D.A., Pig Expert.]

A Profitable Backyard Poultry Flock

During the past four years, 9,185 eggs and 50 table birds have been produced by the writer from an average of less than twelve hens for an outlay of £21 19s. 1d. for feed and £5 17s. for pullets. Fresh eggs, which cost less than 7d. per dozen, were available at all times.

The Stock.

In April, 1940, six laying Australorp pullets (1), and two Rhode Island Red chickens (2) were purchased for producing eggs for the household. A Rhode Island Red rooster was borrowed during the spring, and several clutches of chickens were reared mainly for table use. In November, 1941, twelve White Leghorn pullets (3) six weeks old were purchased to replace most of the older hens during 1942. In November, 1942, twelve young White Leghorn pullets (4) were purchased, and six Rhode Island Red pullets (5) were reared for replacing most of the older hens during the following year. Again, in November, 1943, twelve young White Leghorn pullets (6) were purchased, and a clutch of Rhode Island Red chickens (7) were reared for 1944.

Three hens, an Australorp (1), a White Leghorn (3), and a Rhode Island Red (5) died during the period. Three or four of the young White Leghorn pullets also died, while rats took toll of the first lot of Rhode Island Red pullets reared, shortly after they were segregated from the cockerels and hens (mothers).

A total of 50 cockerels, hens, and less promising pullets have been killed for table use.

On the 31st March, 1944, the following fowls were on hand:—

Rhode Island Red hen (2)	...	1
White Leghorn hens (3)	...	4
White Leghorn hens (4)	...	6
Bantam Cross hen	...	1
Rhode Island Red hens (5)	...	4
White Leghorn pullets (6)	...	11
Rhode Island Red chickens (7)		13
Total	...	40

The numbers in brackets refer to the various lots of laying fowls as added to the flock.

Accommodation.

The hens are housed in an iron shed, 6 ft. wide by 14 ft. long, with a concrete floor, divided into three small pens of equal size, and a 6 ft. x 4 ft. portable coop. The chickens are kept in a small coop opening on to a small run. Water is provided in gallon paint tins. Boxes are used for nests. Shell-grit is placed in small jam tins hung on the walls.

Feed.

The hens and chickens are usually fed twice daily on wet mash in the mornings and whole grain in the evenings. The household scraps are mixed with the ground wheat or pollard and meat meal to form the wet mash. During the first year a variety of foodstuffs, including oats and maize and chicken feed was purchased and fed, but during the last two years the only feeds purchased have been whole wheat, ground wheat, pollard, and meat meal, and fed with very satisfactory results. Greenstuff is provided by lawn clippings, weeds from the garden, and vegetable tops.

If left over the week-end, the fowls were provided with a supply of whole wheat.

The following table shows the quantities of feed purchased and cost:—

Fodder.	Number of Bags.	Weight.
		lb.
Pollard	6	840
Ground Wheat ..	7	980
Ground Barley ..	2	280
Meat Meal	..	250
Wheat	12	2,270
Oats	2	230
Maize	1	168
Cracked Grain ..	..	36
Total Weight ..	..	5,054
Total Cost ..	..	£21 19*s.* 1*d.*

Egg Production.

The fowls were kept primarily for egg production, and Table I., shows the monthly numbers of eggs and the total number of table birds produced, and Table II. the average annual monthly egg production for the different lots of hens.

Table I.

Year.	1940.	1941.	1942.	1943.	1944.
January	..	167	80	156	314
February	..	162	123	103	239
March	..	163	187	90	287
April	48	93	193	128	..
May	72	102	191	182	..
June	84	63	195	240	..
July	136	79	225	346	..
August	169	144	259	436	..
September ..	182	130	286	447	..
October	200	130	271	454	..
November ..	139	130	188	391	..
December ..	159	72	187	353	..
Total Eggs ..	1,189	1,435	2,385	3,326	840
Total Table Birds	8	18	7	13	4

Table II.

Average Annual Egg Production of the Various Lots of Hens.

—.	First Year.	Second Year.	Third Year.
Australorps (1) ..	210	144	..
Rhode Island Reds (2)	234	136	144
White Leghorns (3) ..	184	109	..
White Leghorns (4) ..	207	..	..
Rhode Island Reds (5)	170*	..	..

* Nine months only.

[A.C.T.H.]

Precautions in Poultry-keeping

Pullets must be comfortably housed in their laying quarters if they are to remain profitable. Much depends on the avoidance of overcrowding, proper attention to feeding, keeping the pens free of vermin, and providing an adequate supply of clean straw litter.

As many unsoiled eggs as possible should be produced to avoid the necessity of cleaning them. Clean eggs which have never been washed will keep much better when preserved or stored than eggs subjected to washing. Ample clean nesting accommodation and regularity in collecting eggs is therefore essential.

Breeding stock should be well fed and cared for in preparation for the coming breeding season. In general, the ration which is recommended for layers is suitable for breeders. In the ideal breeding pen the birds are allowed free range. The number of hens to be mated to each male bird will vary with the different flocks, and is also dependent on the varying conditions under which the birds are kept. The more freedom they have the greater the number of hens that can be mated to each male. With White Leghorns, twelve to fifteen hens can be mated to one male; with Australorps and other heavy breeds, from eight to ten.

[H. F. Clinton, Poultry Expert.]

Lice on Fowls.

A new method for the control of lice on fowls has been tried and found very effective.

Use one quarter pint of lysol in three gallons of warm water in a four-gallon tin, the temperature at the commencement being 43 centigrade (109 Fahrenheit), i.e., slightly warmer than blood heat.

Hold the birds by the wings and lower all except the head into the solution, which should be quickly worked through the feathers by rubbing them up the wrong way. This operation takes about five seconds. Then immerse the head for about a second and remove the bird. Wipe down and squeeze the feathers to remove excess liquid. Treat the birds in the morning in reasonably good weather to give them an opportunity of drying out thoroughly.

For the destruction of lice hatched after treatment a further immersion in from 10 to 12 days is necessary.

[W. D. Shew, G.M.V.C., B.V.Sc.,
Senior Veterinary Officer.]

National Security (Shearing of Sheep) Regulations

The information set out hereunder is furnished for the guidance of Sheep-owners and Shearing Contractors operating in Shearing Zones administered by the Man Power Directorate, Victoria, i.e., Zones 8, 9 (that portion within New South Wales south of the Murrumbidgee River; that portion within New South Wales west of the Maude-Oxley-Clare road; and that portion within Victoria), 10, 11, 12, 13 and 14.

1. Stud sheep may be shorn at any time.

2. ALL other sheep and lambs (irrespective of the number of sheep in the flock) MUST BE SHORN DURING THE PERMISSIBLE SHEARING PERIODS PRESCRIBED FOR THE RESPECTIVE SHEARING ZONES, subject to the proviso contained in paragraph 3.

3. Shearing may be conducted during the prohibited shearing periods if the work is carried out by the Sheep-owner with the assistance of his permanent employees or with the help of neighbouring Sheep-owners and their permanent employees, or with "Local Labour." i.e., "Local Shearers and other Shearing Workers who are not engaged in shearing operations outside their own districts (radius of 25 to 30 miles) 1941 or later, and who have not made and do not intend to make arrangements to operate outside their own localities this season".

4. Any Sheep-owner who intends to conduct his shearing during the prohibited shearing period with "Local Labour" must first obtain permission to do so from his District War Agricultural Committee. The necessary application must be lodged at least seven days prior to the proposed date of commencement of shearing. Applications must be accompanied by a full and detailed list setting out the NAME, PRESENT ADDRESS, and FULL IDENTITY CARD NUMBER (for example, V17/M05/814) of EACH PERSON PROPOSED TO BE ENGAGED.

5. Applications for permission to conduct shearing during the prohibited shearing periods with labour other than "Local Labour" will not be entertained except in cases of dire emergency. Applications of this description are to be forwarded to the Officer-in-Charge, Shearing Workers' Register, Room 353, T. and G. Building, Melbourne. The circumstances must be fully explained and substantiated by Statutory Declaration.

6. Any shearing undertaken during prohibited shearing periods without a Permit from the Deputy Director-General of Man Power (Victoria) contravenes the Regulations and Renders the Flock-owner and persons engaged in the shearing operations liable to prosecution (Penalty: £100 or six months' imprisonment).

7. *Identity Cards.*—Every person to be employed upon shearing work by a Block-owner or Shearing Contractor must produce his identity card for inspection by his employer. The employer must obtain from each person engaged the following details for completion of 1944 Shearing Return, namely, FULL NAME, FULL IDENTITY CARD NUMBER, PERMANENT ADDRESS, OCCUPATION WHEN NOT ENGAGED UPON SHEARING WORK and NAME AND ADDRESS OF USUAL EMPLOYER. If an applicant for employment is unable to produce his Identity Card, or refuses to do so, the fact must be reported within three (3) days to the National Service Officer for the area in which the employer is located.

Bees

With the advent of late autumn, preparations for wintering down the apiary should be carried out. A check should be made to see that a queen is present in each hive. Any colony found to be queenless should be united to a colony with a strong young queen.

A good method of uniting is to remove the cover from the colony containing the queen, to place a sheet of newspaper over it and, at dusk, place the queenless hive, bottom-board removed, over the newspaper. The two clusters will soon gnaw away the paper and unite peacefully. If the cluster below is very strong, use two sheets of paper. It is essential that the clusters be disturbed as little as possible when carrying out the operation.

Each colony should have sufficient stores to carry it over the winter.

Colonies short of stores can be supplied with combs of honey drawn from those with a large surplus. If combs of honey are not available, sugar syrup should be given. The syrup is made from equal parts of sugar and water, by volume; mixed warm; and allowed to cool down before use. This can be fed in feeders placed in an empty hive body above the cluster, or poured into empty combs, and given at dusk, when the bees have finished flying. Feeding in day time induces robbing, and greatly upsets the bees.

When feeding a colony to carry it over the winter, it is more economical to feed at one operation, than to extend the feeding over a period of time.

[*continued on page* 231.

Investigations of the Flour Beetles of the Genus Tribolium

I. The Incidence of *T. castaneum* (Hbst.) and *T. confusum* (Duv.) in Wheat and Flour in Victoria.

By L. W. Miller, B.Agr.Sc., Assistant Entomologist, Biological Branch.

TWO species of the genus *Tribolium*—the Red Rust Flour Beetle, *T. castaneum* (Herbst) and the Confused Flour Beetle, *T. confusum* (Duval)—occur commonly in Victoria. Both species are cosmopolitan insects capable of breeding on a wide variety of foodstuffs, but chiefly, they are important economic pests of wheat, flour, and other milled products.

Occurrence in Victoria

In 1942, when a preliminary examination was made of the insects present in both bulk wheat and flour mills in this State, an interesting segregation of the two species was revealed. Whereas *T. castaneum* was the dominant species of this genus present in bulk wheat, it was *T. confusum* that was most prevalent within flour mills.

In the past two years many specimens of the genus have been collected and identified from grain elevators, bag stacks, bulk wheat depots, and flour mills in Victoria. The details of these identifications are shown in Table I.

TABLE 1. SPECIES OF TRIBOLIUM IDENTIFIED FROM WHEAT AND FLOUR IN VICTORIA.

Sample Number.	Locality.	Site.	*T. castaneum.*	*T. confusum.*
		WHEAT.		
1	Cobram	From bulk wheat	74	..
2	Cope Cope	" " "	4	..
3	Donald	" " "	113	1
4	Lascelles	" " "	900	1
5	Lillimur	" " "	400	..
6	Miram	" " "	8	..
7	Murrayville	" " "	8	2
8	Salisbury	" " "	65,000*	..
9	Sheephills	" " "	32	..
10	Ultima	" " "	4,800	1
11	Waaia	" " "	37,000*	..
12	Watchem	" " "	12	..
13	Watchupga	" " "	38	2
14	Woomelang	" " "	..	37
15	Wycheproof	" " "	300	..
16–30	Dunolly	Samples taken from bulk wheat depot	2,000	..
31–40	Murtoa	" " " " "	1,500	..
41	South Kensington	From wheat screw at a flour mill	35	1
42	North Melbourne	From bulk wheat truck at a flour mill	385	..
43	Newport	From wheat silo feeds at a flour mill	9	..
44	Footscray	From wheat stored at a flour mill	200	..
		FLOUR.		
45	Horsham	From flour mill	..	21
46	Mooroopna	" " "	..	1
47	St. Arnaud	" " "	..	125
48–68	Footscray	Samples from a flour mill over a period of six months	..	3,000
69	Sunshine	From flour mill	..	2
70–71	Abbotsford	" " "	..	300
72	Maryborough	" " "	..	25
73	North Melbourne	" " "	..	50
74	South Kensington	" " "	..	100

Samples 8 and 11 marked with an asterisk were estimated figures based on weighing the total number of insects present. In each case 10 subsamples of 100 insects were examined to determine the species present.

The figures shown in Table I. are merely the record of the actual species present in samples, and have no bearing on the relative degree of infestation of either the grain elevators, or the flour mills concerned.

Thus of the 44 separate wheat samples examined, from 21 different localities, *T. castaneum* was the dominant species of the genus in all but two samples—(samples 7 and 14). *T. confusum*, however, was identified from only seven samples.

It is worthy of note that, in Victoria, *T. castaneum* was one of the first of the stored grain pests to be found in any numbers in bulk wheat in storage. Frequently, large numbers of *T. castaneum* were observed massing on the surface of the wheat soon after it had been placed in storage, and considerably in advance of the development of any noticeable populations of what have been termed the "primary" pests—*Calandra oryzae, C. granaria* or *Rhizopertha dominica.*

The flour samples from Table I. revealed that *T. confusum* was the sole species of this genus identified within either the actual milling machinery or the mill streams. In several cases, *T. castaneum* was identified from the wheat that was being gristed, but *T. confusum* was the species that could be found within the milling plants.

Discussion on Species Distribution

Records of the insects present in wheat and flour in Australia during the first World War 1914-18 do not give any clear picture of the species of *Tribolium* present, Winterbottom (1922) listed identifications by Lea in South Australia which merely state that *T. ferrugineum* and *T. castaneum* were abundant in weevilly wheat.

It is presumed that in using the specific name, *ferrugineum*, Lea was perpetuating what Good (1936) termed a misidentification by Mulsant in 1854, and that *T. confusum* was the correct name of the species listed.

No mention could be found in the literature of a similar segregation of the two species. Good (*op cit*). stated that temperature had quite an effect on the distribution of the various species of *Tribolium*. *T. castaneum*, being essentially an insect of warm climates was not usually a permanent resident north of the fortieth parallel in the eastern United States, except in heated buildings. *T. confusum* on the other hand, was more common in the northern part of the United States than in the southern part. From 27° to about 40° N., both species occurred commonly. Cotton and Good (1937) and Shepard (1939) also mention this climatic zoning of the two species.

Were this climatic zoning to apply in the Southern Hemisphere, the bulk of Australia would fall within the zone that is more favourable for the development of *T. castaneum*. Portions of southern Victoria would be within the zone where both species should be common, and *T. confusum* should be the dominant species in Tasmania. While *T. castaneum* is certainly the dominant species in wheat in Victoria, it is difficult to account for its absence within flour mills as being due to a temperature differential, since in general the temperatures within flour-milling machinery in Victoria are sufficiently high to allow of active breeding of both species throughout the year.

Infestations within Flour Mills

Cotton and Wagner (1938) found that the insects entering with the grain stream were an important source of infestation of flour mills. However, from the evidence in Victoria, either the grain stream does not constitute an important source of infestation of flour mills where efficient wheat cleaning plants are in operation, or else the environment within the mills inhibits the development of *T. castaneum*, and not that of *T. confusum.*

All flour mills in Victoria producing flour for export are fumigated at least once each year. An examination was made of the efficiency of a commercial fumigation of a flour mill. An endeavour was also made to determine the source of reinfestation of the mill after fumigation.

Details of Fumigation Test

The dosage of the fumigant was increased from the normal 12 to 16 ozs. of HCN per 1,000 cubic feet in an endeavour to obtain the maximum kill. The pot method of fumigation was employed, using sodium cyanide and dilute sulphuric acid. In all respects, other than the increased dosage, the fumigation followed normal commercial practice. The duration of the fumigation was 24 hours, the temperatures during which period were moderate, the maximum being 88° F. and the minimum 58° F., with an average (based on twelve two-hourly readings) of 65° F.

TABLE 2. MORTALITY OF VARIOUS STAGES OF T. CONFUSUM IN COMMERCIAL FUMIGATION OF A FLOUR MILL, 8.3.42

Position.	Test.	Stage of Insect.	Total.	Alive.	Percentage Mortality.
Centrifugal F—beneath angle filler of conveyor	1	Eggs with flour ..	50	..	100
	2	Larvae with flour ..	46	..	100
	3	Pupae with flour ..	50	..	100
	4	Adults with flour ..	62	1	98.4
	5	Pupae without flour ..	50	..	100
Centrifugal G—beneath angle filler of bottom conveyor	6	Larvae with flour ..	50	2	96
	7	Pupae with flour ..	50	..	100
	8	Larvae without flour ..	50	..	100
Purifier—bottom conveyor	9	Adults without flour ..	50	..	100
Top Spout—down 6 feet from top ..	10	Adults without flour ..	50	..	100
	11	Pupae with flour ..	50	..	100
	12	Pupae with flour ..	50	..	100
Dust Collector	13	Pupae without flour ..	50	..	100
	14	Adults without flour ..	50	..	100
Top of Elevator	15	„ „ „ ..	50	..	100
Elevator Boot—in basement beneath 2 inches of stock	16	„ „ „ ..	50	..	100
Exhaust Spout—half way along	17	„ „ „ ..	53	..	100
C. Reduction Roll—in dead angle	18	„ „ „ ..	52	..	100
Basement—in bag of bran	19	„ „ „ ..	43	26	39.5
Purifier	20	„ „ „ ..	50	..	100

Approximately 1,000 test insects—various stages of *T. confusum*—were used to assess the biological efficiency of the fumigation. These insects were placed throughout the milling plant, particular attention being paid to machinery where it was anticipated that there might be difficulty in achieving a high mortality. The test insects were placed either in small wire cages or in muslin bags, some of which contained a small quantity (approximately 10 gms.) of flour. All test insects were from stock cultures that had been maintained in the laboratory, at a temperature of 30° C., and a relative humidity of 75 per cent.

At the completion of the fumigating period, the test insects were removed, examined, and incubated with food for several days before the final counts were made.

Discussion on Result of Fumigation Test

Of particular interest was the failure to obtain a complete kill of the insects in the centrifugal sifters (Tests 4 and 6). Because of the design of these machines, it was impossible to completely rid them of small accumulations of infested flour, and, apparently, the penetration of the fumigant into these inaccessible places was not sufficient to achieve a complete kill.

The low kill of insects within the bag of bran (Test 19) merely illustrated the danger of leaving odd bags of infested stock within a mill during a fumigation.

Following the fumigation, periodic inspections were made of the mill to ascertain when insects reappeared in the machines. Within eight weeks, *T. confusum* could be found in small numbers in the centrifugal sifters where incomplete kills of the test insects had been obtained. Later, further specimens of *T. confusum* were found in the reduction rolls, and some of the elevators. No insects could be found at the head of the mill, i.e., where the grain stream entered, although small numbers of *T. castaneum* were found in the wheat being gristed.

It was not surprising that the commercial fumigation, even at the increased dosage, did not eradicate the insects within the mill, since in practice, a complete kill of all stages of an economic pest is seldom achieved. The results of the fumigation, however, showed that on this occasion, at least, the population of *T. confusum* developed from survivors from the fumigation, rather than from insects brought in with the grain stream.

It was noticed that, in most cases where flour mills were receiving at least one fumigation with HCN annually, the Mediterranean Flour Moth, *Ephestia kuhniella* (Zell.), was no

[*Continued on page* 221.

Firebreaks in Pastoral Country

The Possibilities of Kikuyu Grass

By L. C. BARTELS, B.Agr.Sc., Senior Agrostologist

THE fires that recently devastated enormous areas of Victorian grasslands have been followed by a flood of suggestions as to how a recurrence of such a disaster may be prevented. Some of these have been eminently sensible, others quite the reverse. Naturally most attention has been focused on the establishment by landowners of firebreaks on their properties to arrest the spread of the fire when an outbreak occurs. Many landowners already do this by ploughing narrow strips around their boundaries and it has been suggested by a correspondent that these strips would be more effective if planted with a summer growing crop, such as lucerne, which would be green during the period the fire danger is greatest. Alternative crops suggested by the correspondent are mangels, maize or any other summer-growing fodder and he contends that an additional advantage of this system would be the provision of green feed for sheep and other animals at a time when it is most required.

However, while lucerne is a permanent crop the others mentioned are annuals and their culture involves annual ploughing of the ground and repeated cultivation, a formidable undertaking on a big farm or pastoral holding.

Further, in those parts of Victoria where grass fires were worst, the cultivation of summer fodders is a speculative undertaking especially in a summer such as the last when protracted dryness was the main factor responsible for the widespread fires.

Lucerne is a drought-resistant plant, but its successful establishment and maintenance require considerable care. It also requires regulated grazing if it is to survive and unless it is fenced off, lucerne would not survive the concentrated selective grazing to which it would be subjected.

Many farmers sow rape and the summer-growing fodder crops in proximity to homesteads and stackyards, and this is a good practice, but of course it involves fencing and repeated attention.

What is needed is something that will provide a break cheaply and permanently without the expense of enclosure, and something that will not involve recurring expense.

Until pasture topdressing was general, an effective practice was to topdress strips of pasture on the "windward side" of pasture paddocks. The stock grazed such strips heavily and there was very little dry herbage left. Such heavily grazed strips would tend to retard the advance of a grass fire.

However, topdressing is more general now, and the stock do not concentrate as they would where only portions of the pastures are topdressed.

The most practical proposition along the lines required is to sow some hardy summer-growing grass which will present a green picking in early summer and will withstand persecution by stock which are greedy for green feed even when they have an abundance of dry feed. Outstanding in this regard are the two grasses, Paspalum dilatatum and Kikuyu grass, and there is experimental evidence to show that these grasses both grow well and withstand hard grazing in the south-western district of Victoria.

For example on the farm of Mr. G. Murfitt, at Cudgee near Warrnambool, a plot of Kikuyu grass, included in a series of grass species plots, has been selectively grazed, and such a strip would make a good barrier to the progress of a grass fire in the early summer.

Paspalum is a tussocky grass. It is established from seed and may be sown in spring with expectations that it will make a consolidated sward after a year or two.

Kikuyu grass is a hardy summer-growing grass which must be established by planting pieces of rooted runners. Appropriately, this is done in early spring and such pieces of runners may be effectively planted by dropping them in the furrows when ploughing the customary fire breaks.

Kikuyu grass likes warmth and moisture, and given these it becomes most aggressive, and although the milder climates and relatively dry summers of the Western District are not conducive to best growth, Kikuyu grass has shown itself to be drought resistant and tenacious under the conditions there. The stock seek it

and graze it heavily, leaving a close green sward, and undoubtedly it offers promise of protection against fire.

Bags of Kikuyu grass-rooted runners are available commercially and may be planted in alternate plough furrows say 4 feet apart. After a time a limited area of the grass will provide all the material needed for extensive plantings.

Kikuyu grass is recommended to farmers for trial, not only as a supplementary summer grass which is needed in Western District pastures, but, as in this case, for a firebreak which is likely to be permanent and relatively effective.

THE FLOUR BEETLES OF THE GENUS TRIBOLIUM—*continued from page 219.*

longer a major pest. Dean *et al* (1937) recorded a similar position in the United States, and attributed it to the greater susceptibility of *Ephestia kuhniella* to HCN.

According to Shepard (*op cit*), *T. castaneum* is somewhat less resistant to fumigants than *T. confucum*. Consequently, it may be that regular mill fumigations have assisted in eliminating *T. castaneum* while failing to eradicate *T. confusum*.

Summary

In Victoria two species of the genus *Tribolium, T. castaneum* (Hbst.) and *T. confusum* (Duv.) occur commonly as pests of stored products.

T. castaneum was found to be the dominant species of this genus in bulk wheat, whereas *T. confusum* was dominant within flour mills.

An examination of the efficiency of a commercial fumigation with HCN revealed that a complete kill of all stages of *T. confusum* was not obtained, and, moreover, the reinfestation of this mill appeared due to a build-up from the survivors, rather than the introduction of *T. confusum* from outside in the grain stream.

Either the grain stream does not constitute a very important source of infestation of flour mills in this State, or else the environment within the milling plant does not favour the survival of *T. castaneum*.

Environmental factors such as the normal temperatures within the mills and the moisture contents of the milled stocks do not appear likely to inhibit one species more than the other.

Regular mill fumigations may play an important part in eliminating the more susceptible *T. castaneum*.

In addition the food materials available to the insects within a flour mill might have an important bearing on the development of either species. Consequently, an analysis of the food value of various mill fractions to the species of *Tribolium* was commenced; the results of which will be the subject of later papers.

Acknowledgments

The assistance of officers of the Australian Wheat Board and the Victorian Grain Elevators Board is gratefully acknowledged, as is also the helpful co-operation received, at all times, from Mr. F. Wilson, of the Council for Scientific and Industrial Research.

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A CORRECTION

In the March issue of this *Journal* in the article " Cool Storage of Apples ", reference was made to the use of skin coatings for prolonging the storage life of apples. One skin coating discussed was a 10 per cent. alcoholic solution of castor oil and shellac which, it was stated, was developed by the Council for Scientific and Industrial Research Food Preservation Laboratory, Homebush, N.S.W. We have now been advised by Dr. J. R. Vickery of that laboratory that the formula was originally supplied by Dr. R. G. Tomkins of the Low Temperature Research Station, Cambridge, England.

WANTED—

A Record Potato Crop

Contributed by the AGRICULTURAL DIVISION

IN the early phases of the war Australian attention was focused mainly on the urgent necessity for producing armaments and still more armaments. Food supplies were not a problem except in regard to the disposal of surpluses.

After five years of struggle the position has changed greatly. Australia must now devote a greater proportion of her energy and initiative to the supply of more and more food, not solely for the maintenance of our own civilian and military population but to fill in generous measure commitments to Allied civilian and military services.

The farming community left to this State has met almost every production demand made on it, in spite of the acute discomfort and inconvenience resulting from lack of adequate or skilled labour, and the paucity of much needed equipment. Over the last two years particularly, Victorian potato growers have contributed greatly to the total food requirements of the Commonwealth. Compared with an immediate pre-war average of approximately 40,000 acres planted to potatoes, the planting in 1942-43 approximated 52,000 acres, and in 1943-44, 77,000 acres.

An even greater production is demanded in 1944-45. Out of a planned Commonwealth production in the coming season of 278,000 acres, Victoria is asked to produce 94,000 acres, or more than one-third of the total, and that production must be obtained without detracting from the production of other high priority products such as milk, butter, cheese and meat.

On a calm analysis the proposition seems almost impossible, but many people thought it was impossible to elevate last year's planting from 52,000 to over 70,000 acres. Victorian growers will again demonstrate in the coming season that the seemingly impossible is possible.

It is not sufficient however that this State should plant a record acreage to potatoes—the maximum objective will be obtained only if a record tonnage per acre is produced. The volume of crop per acre is determined largely by rainfall, but there are many factors within the grower's control which exert a potent influence on yield per acre. The kind of potato seed planted is one of the most important of these grower-controlled factors.

In some quarters the conception has arisen that any small potato tuber is a good seed potato, but this is not so. A potato tuber will produce the same sort of plant as that from which it came, hence it is important that seed should come from crops which generally are free of disease, and possess potential high yielding characteristics.

Growers are advised to pay particular care to the selection of their seed. Good stock means a good crop and any premium that may be asked for superior grades of seed represents a cost that will be repaid many times in the form of a heavier yielding crop.

Growers who are dissatisfied with the performance of their own seed stock should endeavour to obtain certified seed, approved seed, or failing that, seed from the best crop which they can locate. As a general guide seed from areas of high elevation is more productive than seed from low-lying areas.

As well as endeavouring to locate good crops from which to obtain their seed stock, growers should make early arrangements covering the purchase of their seed requirements. Owing to the extremely dry season, the total State yield of potatoes will not be a heavy one despite the great area planted. Late in the season, good seed stock will be in extremely short supply and those people who defer their seed purchases until August and September may find that tubers ideally suited for seed purposes have gone into the pot for human consumption.

Potato growers therefore are urged to organize the year's programme so that the maximum area which can be efficiently handled is planted with the best stock available.

Seed Potato Certification

List of Growers, 1944

By G. H. MATTINGLEY,
Potato Expert

THE Victorian Seed Potato Certification Scheme was introduced for the main purpose of raising the standard of potato growing in the State by promoting the production and distribution of high quality seed.

Seed from crops of the main commercial varieties which have been found true to type and practically free from disease is harvested and graded under supervision. Before it leaves the farm each bag is labelled and stamped with the Government seal.

It should be pointed out that seed potatoes, whatever their origin, cannot be regarded as "certified" if they are not contained in sealed bags bearing the official label. Growers are warned that the term "certified" must be applied only to seed potatoes harvested from a certified crop and packed in sealed bags bearing a label signed by the inspector.

Sales of certified seed may be made by direct negotiation between buyer and seller, subject to a Potato Sales Permit, obtainable from any potato inspector.

The list hereunder gives particulars of all crops which have passed the field inspections and from which certified seed will be available:—

LIST OF GROWERS OF CERTIFIED SEED POTATOES, 1944.

Name.	Address.	Acres.
EARLY CARMAN.		
Allen, J. M. and R. ..	Wheelan's Loose Bag, Leongatha	8
Auchterlonie Bros. ..	Narracan	20
Collery, Jas. ..	Kerrie, via Romsey ..	12
Collery, John ..	Hesket, via Woodend ..	9
Coulter, R.	Nichol's-road, Leongatha ..	12
Cromb, A. E. ..	Dee River-road, Millgrove ..	12
Hassett, J. T. ..	Boorool Estate-road, Leongatha	4
Mayo, L. C. ..	Thorpdale	24
Miller, A.	Monument Creek, via Woodend	8
*Powell, H., and Sons	Thorpdale	21
Stewart, G. C. ..	Box 65, Yarragon	2
White, J.	"Elnaam," Neerim ..	2
*Wilson, V.	Neerim Junction	8
LATE CARMAN.		
Bayliss, L.	Moondarra	27
Bellchambers, F. ..	Beech Forest	4
Brown Bros. ..	Wyelangta	4
Butler, J.	Weeaproinah	4
Clements, C. E. ..	Hesket, via Woodend ..	36
Collery, Jas. ..	Kerrie, via Romsey ..	7
Collery, J.	Hesket, via Woodend ..	11
Congram, W. J. P. ..	Beech Forest	10
Cromb, A. E. ..	Dee River-road, Millgrove ..	2½
D'Arcy, F. F. ..	Greendale, via Bacchus Marsh	8
Dow, R. and W. ..	Ferguson	2
Easdown Bros. ..	Kinglake Central	9
Else, J. F.	Romsey	14
Exton, Arnold ..	Pheasant Creek, via Whittlesea	4½
Exton, A. P. ..	Pheasant Creek, via Whittlesea	2
Exton, C., and Sons ..	Kinglake Central	137
Fry, J. G.	Beech Forest	3½
Grosse, H. G. ..	Beech Forest	5½
Gunn, N.	"Wendource," Thorpdale ..	6
Harris Bros.	Cockatoo	7
Hawkins, E. T. ..	Kinglake	22
Higgins, F. W. ..	Irrewarra	4½
Kelly, J., Jnr. ..	Pheasant Creek, via Whittlesea	2
Knox, J., and Son ..	Weeaproinah	8
Leggo, E. G. and J. R.	Italian Hill, Daylesford ..	12
Lundy, W. A. ..	Erica	4
Meehan, B. P. ..	Webster's Hill, via Beech Forest	2
Minchinton, E. A. ..	Weeaproinah	25
Murchison, A. M. J. ..	Ferguson	17
O'Brien Bros. ..	Weeaproinah	14
Owen, F. J., and Sons	Pheasant Creek, via Whittlesea	5
Skinner, F. T. ..	Ferguson	4½
Smith, F. E. ..	"Tarcombe," Thorpdale ..	4
Stewart, G. C. ..	Box 65, Yarragon	2
Stewart, J.	"Korowai," Trafalgar ..	1½
Tann, W. H. ..	Weeaproinah	10
Thom, J. R. ..	Kinglake Central	11
Toohey, D. J. ..	Pheasant Creek	12
Toohey, J.	Kinglake	56
Toohey, L. F. ..	Kinglake	26
Toohey, T. J. ..	Kinglake	26
Towers, A. J. ..	Beech Forest	10
White, J.	"Elnaam," Neerim ..	10
*Wilson, V.	Neerim Junction	3
Young, R. and A. ..	Weeaproinah	5
UP-TO-DATE.		
Brown Bros. ..	Wyelangta	16
Butler, J.	Weeaproinah	4
Congram, W. J. P. ..	Beech Forest	15
Copeland, B. ..	Wyelangta	14
Deppeler Bros. ..	Beech Forest	20
Knox, J., and Son ..	Weeaproinah	4
Murchison, A. M. J. ..	Ferguson	3
McBeth, J.	207 Neerim-road, Carnegie ..	2
Perry, J. A. ..	Beech Forest	7
Rosato, G.	Wyelangta	1½
Simmons, G. T. ..	Wyelangta	4
Smith, J., and Sons ..	Stalker	2
Tann, W. H. ..	Weeaproinah	4
SNOWFLAKE.		
Collery, Jas. ..	Kerrie, via Romsey ..	5
Collery, John ..	Hesket, via Woodend ..	5
Dalziel, J. C. ..	Clarke's Hill	2
Labbett Bros. ..	Clarke's Hill	43
White, J.	"Elnaam," Neerim ..	2
KATAHDIN.		
Exton, C., and Sons	Kinglake Central	12
Giles, A. W., and Son	Koo-wee-rup	14
Grosse, H. G. ..	Beech Forest	2
Knox, J., and Son ..	Weeaproinah	5
*Wilson, V.	Neerim Junction	1
SEBAGO.		
Giles, A. W., and Son	Koo-wee-rup	3
Knox, J., and Son ..	Weeaproinah	3

* Entire crop sold.

Approved Potato Seed—

. . List of Growers

Issued by the AGRICULTURAL DIVISION

EACH year a greater number of potato-growers are appreciating the value of good potato seed, and each year the amount of seed purchased by growers who are not satisfied with the performance of their own stock is increasing.

This year Victoria is expected to plant 94,000 acres to potatoes and, in consequence, a heavy demand for seed is anticipated. In order to locate crops suitable for seed the Department of Agriculture, during the latter end of March, carried out a large number of field inspections of potato crops in recognized seed-growing areas, and tabulated the incidence of disease and varietal impurity in the crops inspected. Those crops showing more than 90 per cent. freedom from visible disease and not more than 3 per cent. varietal impurity, were considered as suitable for seed and are listed hereunder as approved seed crops.

Approved seed crops, however, should not be confused with certified seed crops. Certified seed, which conforms to a higher standard of purity and freedom from disease, is marketed in sealed bags carrying the Department's official certification label. No such distinguishing features will be attached to bags of approved seed.

In general, certified seed is the highest quality of potato seed obtainable, while approved seed is the next highest quality and is suitable for commercial crop production.

Owing to the late date at which crop inspections were made it was not possible to cover any appreciable area of Early Carman crops. Inspections, therefore, were virtually confined to crops of the Late Carman and Up-To-Date varieties.

It is anticipated that the ceiling price for approved seed will be £1 per ton higher than the maximum price which can be charged for unapproved seed.

Growers should make arrangements for the purchase of their seed requirements at the earliest possible date.

CENTRAL HIGHLANDS

Name and Address of Grower.	Tonnage Approved.
VARIETY—LATE CARMAN.	
Skelton, E., Scotsburn	24
Howard, W., Scotsburn	22
Walsh, J. M., Warrenheip	60
Maher, M. F., Warrenheip	33
Greene, S., Warrenheip	11
Kane, T. and W., Warrenheip	16
Ronan, W., Warrenheip	22
Murphy, A., Dunnstown	33
O'Loughlin, C., Dunnstown	22
O'Loughlin, J., Dunnstown	64
Glenane, J. F., Dunnstown	11
Glenane, K., Dunnstown	96
Calder, G. R., Bungaree	24
Trigg, M., Bungaree	8
Trigg, N., Bullarook	16
Keating Bros., Bungaree	48
Tinney, A. R., Bungaree	11
Shearer, W., Bungaree	24
Grigg, Arthur, Bungaree	22
Trigg, H. and Son, Bungaree	16
Downey, E., Wallace	16
Shearer, A., Wallace	16
Carroll, R., Wallace	22
Donegan, J. P., Wallace	36
Ryan, M. P., Wallace	10
Sandwith, S., Wallace	10
Chapman, W. W., Gordon	33
Ryan, T. M., Gordon	55
Carey, C. J., Gordon	80
Ryan, J. M., Gordon	10
Cooney, J. W., Gordon	48
Tudor, L., Gordon	33
Betteridge, G. I., Spring Bank	20
Clohesy, T., Spring Bank	48
Donellan, M., Millbrook	48
Toohey, J. P. and J. V., Millbrook	60
Sullivan, J. J., Millbrook	48
Hayden and Gleeson, Millbrook	72
Bubb, J. J., Springback	8
Hogan, D., Bunding	16
Egan, J. M., Bunding	48
Lanaghan and Shaw, Ballan	27
Binks Bros., Ballan	44
Shearer, P., Bolwarrah	70
McEldrew, Mrs., Bolwarrah	8
Ralston Bros., Pootilla	33
Rumbler, J. C. and Son, Wattle Flat	20
Kelly, B., Wattle Flat	22
Labbett Bros., Bullarook	60
Wade, T., Bullarook	22
Duke, E. Bullarook	8
Riley, K. and A., Bullarook	48
Guthrie, T., Bullarook	16
Suckling, T., Clarke's Hill	26
Prendergast, A., Clarke's Hill	22
Dalziel, J. C., Clarke's Hill	33
Powell, D. B., Clarke's Hill	11

CENTRAL HIGHLANDS—*continued*

Name and Address of Grower.	Tonnage Approved.
VARIETY—LATE CARMAN.	
Donovan, J., Claretown	11
McKay, W. A., Dean	30
McKay, G., Dean	22
Bousted, A. C., Dean	112
Haintz Bros., Dean	48
Scobie, L., Dean	38
Clark, P., Dean	48
Tait, E. M., Dean	48
Clark, W., Mollonghip	16
Quick, N. J. W., Mollonghip	80
Quick, N. W., Mollonghip	60
O'Keefe, W., Mollonghip	24
May, G. S., Kingston	11
May, T. E., and Son, Kingston	11
McLeod, W. A., Springmount	8
Huggins, H. R., 1016 Eyre-street, Ballarat	11
Troup, John, Coghill's Creek	33
Ryan, J., Blowhard	32
Britt, C., Jnr., Dunnstown	25
Sheehan, C., Dunnstown	20
Kennedy, B., Dunnstown	11
Glenane and Ryan, Dunnstown	48
Britt, E., Dunnstown	20
Britt, Thomas, Dunnstown	22
Liversidge, R., Leonard's Hill	6
Liversidge, H., Leonard's Hill	25
Dwan, J., Musk Vale	3
Anderson, A. J., Daylesford	70
Balharrie, A. S., Daylesford	96
Courtney, M., Daylesford	33
Russell, W. J., Porcupine Ridge	11
Kirby, A., Coomoora	48
Garner, A. O., Bullarto South	100
Orr, F. S., Bullarto	80
Mossop, E. M. and C. W., Bullarto	44
Frith, J. J., Bullarto	72
Brown, P., Bullarto	24
Trewhella, Miss C. A., Trentham	5
Connors, P. J., Trentham East	16
D'Arcy, Dr. F. F., Greendale	16
McKeown, J., Fern Hill	11
VARIETY—UP-TO-DATE.	
Macklin, T., Mollonghip	27
Toomey Bros., Trentham	11

ROMSEY DISTRICT

Name and Address of Grower.	Tonnage Approved.
VARIETY—LATE CARMAN.	
Maskell, W. A., Romsey	20
Cook, L. J., Romsey	25
Thorneycroft, W. J. and Haslett, A. J., Romsey	30
Mumford, A. G., Hesket	16
Winford, B., Hesket	25
Else, Arnold, Hesket	22
Winwood and Tate, Hesket	15
Miller, A., Monument Creek	11
Barbour, C. M., Rochford	18
Muntz Bros., Woodend	22
Crozier, G. S., Newham	55
Newham, Vinnicombe and Hall, Newham	8
Newnham, R. H., Newham	27
Spring Bros., Romsey	16
Trewhella, C. and A. B., Newham	44

KINGLAKE

Name and Address of Grower.	Tonnage Approved.
VARIETY—LATE CARMAN.	
Reeves, S., Kinglake East	33
McMahon, J. P., Kinglake East	36
Beech, G., Kinglake East	55
Toohey, T., Kinglake	33
Dawes, E., Kinglake	28
Moore, R., Kinglake	48
Easdown Bros., Kinglake Central	44
Lawrey, L. K., Kinglake Central	180
Thom, J. R., Kinglake Central	48
Curry, M. J., Kinglake Central	20
Pearson, Mrs. J., Kinglake Central	16
McKenzie, A., Kinglake Central	44
Johnston, E. J., Kinglake Central	60
Toohey, D. J., Pheasant Creek	88
Exton, A., Pheasant Creek	36
Exton, A. P., Pheasant Creek	8
Owen, F. J., and Sons, Pheasant Creek	212
Watson, R. C., Pheasant Creek	18
Jenkins, G. R. Kinglake West	72
Carman, H., Kinglake West	22
Williamson, T., Kinglake West	60
Nicholls Bros., Kinglake West	35
Williamson, F., Toolangi	8
Beattie, D., Kinglake West	50
Southurst, R. J., Kinglake West	44
Gangelhoff, H., Pheasant Creek	60
Garratt, L., Pheasant Creek	35
Garratt, G. E., Pheasant Creek	18
Fenn, J. W. and W. J., Pheasant Creek	18
Rotherford, J., Pheasant Creek	16
Kelly, J., Pheasant Creek	60
Campbell, H. W., Kinglake	60
Yarwood, P., Kinglake	33
Dyball, J. and A., Kinglake	18
Brenda, J., Castella	18
Smedley, A. P., Toolangi	16
Monk, J., Toolangi	16
Biggs, H., Toolangi	48
Rimington Pty. Ltd., Healesville	22
Ramsay, G.	33

EMERALD DISTRICT

Name and Address of Grower.	Tonnage Approved.
VARIETY—LATE CARMAN.	
Marriott, C. W., Toolebewong Lodge, Healesville	165
Aitkin, L., Woori-Yallock	140
More, J., Woori-Yallock	2
Johns, P. S., Selby	110
Knight, W. D., Cockatoo	40
Noonan, Dr. T. P., Burleigh	11
Wise, H. J., Emerald	11
Beasley, H. G., Emerald	20
Roberts, F., Emerald	12
Wescombe, W. R., Emerald	65
Dyer, M. H., Gembrook	20
Hamilton, A., Gembrook	40
Robertson Bros., Gembrook	40
Ure, A., Gembrook	50
Hocking, R., Gembrook	16
Gunther, T. H., Gembrook	28
Beggs, J. A., Gembrook	44
DeMartino, G., Gembrook	65
Simpson, F. M., Gembrook	35
Nash, W. L., Macclesfield	50
Harris, Bros., Cockatoo	33
Fielder, F. W., The Basin, via Bayswater	6

NEERIM—WARRAGUL

Name and Address of Grower.	Tonnage Approved.
Variety—Late Carman or Cook's Favourite	
Rawson, C., Erica	40*
Jones, G. R., Warragul	24*
Jones, J. R., Warragul	14*
Rowe, C., Roseworth, via Neerim	28*
Rowe, C., Roseworth, via Neerim	4†
Murphy, L., Neerim East	60*
Murphy, L., Neerim East	30†
Algie, J., Neerim South	180*
Murphy, Jas., Neerim	100*
Murphy, Jack, Neerim	25*
Murphy, Jack, Neerim	12†
Barr, E., Neerim	11*
Barr, E., Neerim	16†
Stammers, H., Neerim	16*
Hall, W., Neerim	20*
Hall, W., Neerim	40†
McDougal, R., Neerim	32*
McDougal, R., Neerim	11†
Blain, A. and Brunton, D. L., Neerim	66*
Blain, A. and Brunton, D. L., Neerim	60†
McDougal, J. A., Neerim	44*
Bransgrove, W. A. D., Neerim	55*
Ward, S. H., Neerim North	22*
Ward, S. H., Neerim North	3†
Arnott, A. E., Modella	25*
Noonan, W., Neerim	7*
Noonan, W., Neerim	3*
Duncan, W., Neerim	50*
Wheeler, J. W., Trafalgar	6*

* Late Carman † Cook's Favourite

SOUTH GIPPSLAND

Name and Address of Grower.	Tonnage Approved.
Variety—Late Carman.	
Lloyd, A. W., Thorpdale South	16
Burvill, A. L., and Moore and Son, A. and C. T., Thorpdale	40
Roach, W. J., Thorpdale	16
Dempsey, F. L., Stony Creek	8
Mayo, R. S., Stony Creek	33
Helms, E., Buffalo, South Gippsland	16
Fowkes, R., Mirboo North	16
Foy, C. and W., Mirboo North	40
McLure, J. F., Thorpdale South	27
Triena, T., Thorpdale	6
Fraser, J. A. and F. A., and Coates, G., Thorpdale South	43
Gunn, M. A., Thorpdale	32
Matthews, C., Thorpdale	8
Latter, R. H., Mt. Eccles	112
Rowe, M., Mt. Eccles	32
Hamilton, T., Meenlyan	20
Stewart, A. G., Yarrgon South	5
Graydon and Womersley, P. F., Yarragon South	27
Irving, J. T., Moyarra, via Korumburra	5
White, H., Kongwak	10
Stewart, T., Kernot	16
Barker, J., Leongatha	8
O'Leary, J. J., Garfield	43
Hulls, F. J., Kooyooman, via Leongatha	27

SOUTH GIPPSLAND—*continued*

Name and Address of Grower.	Tonnage Approved.
Variety—Up-To-Date.	
Hamilton, A. B., and Son, Fish Creek	33
Arnup, E. J. and W. S., Foster North	32
Hynes Bros., Leongatha	16
Bell, J., Wooreen	11
Moran, J., Hoddle	22

BEECH FOREST DISTRICT

Name and Address of Grower.	Tonnage Approved.
Variety—Late Carman.	
Young, A., Beech Forest	27
Grosse, H. G., Beech Forest	33
Close, R., Beech Forest	18
McKenzie, N., Beech Forest	16
Joiner, A., Beech Forest	11
Fincher, B. L., Beech Forest	40
Davies, Mrs., Hotel, Beech Forest	6
Mazzani, C., Weeaproinah	55
Barker, L. G., Weeaproinah	40
Hansen, H. T., Weeaproinah	77
Renzella, C., Weeaproinah	40
Nation, E. A., Weeaproinah	25
Bichard, A. S., Ferguson	18
Townsend, J., Ferguson	22
Parker, G., c/o Townsend, Ferguson	17
Francis, A., Ferguson	35
Dow, R. and W., Ferguson	60
Baulch, G. R., Stalker	88
Rolfe, c/o J. Butler, Stalker	6
Forsman, R., McDevitt	15
Grove, G., and F. W., Olangolah East	14
Berry, H., Laver's Hill	16
Mitchell Bros., Gellibrand	20
Pyle, A. R., Wonga Vale, Gellibrand	75
Middleton, H., Nalangil, via Colac	55
Arundel, A. A., Larpent	18
Callanen and Knight, Colac	27
Hay, J., Colac	27
Holland, J., Colac	30
Burns, A., Colac	33
Variety—Up-To-Date.	
Fry, J., Beech Forest	36
Heal, H. G., Beech Forest	21
Fincher, B. L., Beech Forest	18
Mazzani, C., Weeaproinah	50
Minchinton, E. A., Weeaproinah	82
Renzella, C., Weeaproinah	22
Rolfe, c/o J. Butler, Weeaproinah	6
Gard, S. M., Ferguson	16
Townsend, J., Ferguson	16
O'Dowd, J., Laver's Hill	16
Hobson, J., Laver's Hill	16
Morris, E., Laver's Hill	24
Henrickson, O., Laver's Hill	20
Hadwin, W., Laver's Hill	15
Baulch, G. R., Stalker	18
Schriever, C., McDevitt	35
Forsman and Farr, McDevitt	40
Copeland, B., Wyelangta	75
Rosato, G., Wyelangta	48
Renzella, N., Wyelangta	11
Brown, D., Wyelangta	71
Brown, C., Wyelangta	11
Grove, G. A., and F. N., Olangolah East	16
Stafford, J., Crowes	18
Browning, G., Wimba	32
Hay, J., Colac	3
Burns, A., Colac	27
Skinner, F. T., Ferguson	22

IN THE ORCHARD

Contributed by the Horticultural Division

Wind Protection for Orchards

Orchard windbreaks of Pinus insignis, Doncaster district

WIND storms have frequently caused much damage and loss on orchards. The damage varies in form and extent but is always a source of monetary loss to fruitgrowers. Citrus growers in particular have suffered severely through wind damage. Although the skin of citrus fruits is fairly thick and tough in comparison with other kinds of fruit, it is very susceptible to injury and even the continual abrasion by leaves has been known to produce rind blemishes. Citrus trees exposed to high wind do not make vigorous growth and their productivity is thus reduced.

Growers of deciduous fruits have also suffered heavy losses. Windstorms at or near the maturity of apple and pear crops are a frequent cause of fruit dropping. Williams' pears are particularly sensitive to winds especially in the month of January. Some protection is now available to apple and pear growers in the form of hormone sprays which enable fruit to hang on the trees during the danger period.

The training of young fruit trees becomes a difficult matter under exposed conditions. Young pear and peach trees which make vigorous growth in the first few years may have leaders blown across into the centre of the tree by persistent winds from one particular direction during the growing period. This necessitates heavy pruning and extra time in tying back the bent-over leaders.

Having thus indicated some of the problems arising from wind, the question of a remedy arises. Unfortunately, however, there is no complete remedy but by showing a certain amount of forethought growers can provide some protection for their trees by the growing of windbreaks or shelter-belts of fast-growing trees. That the value of windbreaks has been realised for many years can be seen by visiting some of the older established orchard districts in the State. At Doncaster, for instance, there are many fine examples of pine belts, some well over sixty years old.

Varieties of Trees Suitable for Windbreaks

Pinus radiata is the commonest variety of pine used for windbreaks. Planted 10 to 15 feet apart, these trees grow rapidly and provide one of the most effective breaks for an orchard. They grow well in all districts with a rainfall of more than 25 inches.

Cupressus Lambertiana horizontalis is the most vigorous-growing cypress. Planted 15 to 20 feet apart, the trees make a solid break because of the spreading branches.

Eucalyptus cladocalyx (Sugar gum) is upright growing and very useful as a break. The trees should be planted 8 to 10 feet apart and after five years, the alternate trees should be pollarded at six feet in order to provide low growth to fill the gaps between the taller trees. This variety is well suited to warmer districts.

Eucalyptus botryoides (Mahogany gum) is a fast-growing eucalypt with denser, more bushy growth than the sugar gum, and may be planted alone or inter-planted with sugar gums. Plant 10 to 12 feet apart.

Eucalyptus globulus or Blue gum provides a satisfactory breakwind in the cooler districts and also may be grown in irrigation areas if the trees are supplied with water. Plant 8 to 10 feet apart.

Schinus molle (Pepper tree) is hardy and particularly well-suited to the drier northern districts. Plant 15 to 20 feet apart.

Almonds have been widely planted in the northern irrigation areas as protection for vines and citrus. Upright varieties include Brandes Jordan Chellaston, Johnson's Prolific and I.X.L. The first and last pair should be planted together for cross pollination.

Olives are useful as windbreaks and profitable as a sideline under irrigation in the north. Suitable varieties include Manzanillo, Mission, Corregiola, Bouquettier. There are numerous other species of trees which may be used for windbreaks such as the willow, boobialla, fig, Osage orange, &c.

The main factor in establishing a successful plantation is to keep the ground around the trees well cultivated during the summer and, in northern districts particularly, applying ample water for the trees' requirements. Some time given to the care of windbreaks for the first few years will be amply repaid by healthy, rapid growth. For best results a windbreak should be planted at the same time as the orchard, but this serves as no excuse for delaying planting a break around an already established orchard.

Apricot Scab

Apricot scab causes the hard scabs on apricots which spoil their appearance and lower the market value of the fruit. Leaf infection in the leaves is localized, the infected area dropping out, causing the shot hole effect. This disease is worst under wet conditions which frequently prevail during spring in southern Victoria. The disease also infects the buds of peach trees and may result in the death of lateral growths. Bordeaux mixture, strength 6:4:40 is the most effective spray for this disease and should be applied when most of the leaves have fallen, usually in late May, and again in the spring when the buds are just showing pink. For the home gardener, four gallons of spray may be made by dissolving 9 ounces of copper sulphate crystals in 2 gallons of water in a non-metallic vessel, mixing 9 oz. of slacked lime in 2 gallons of water in another vessel and combining the two solutions.

IN THE GARDEN

By J. L. PROVAN, B.Agr.Sc., Principal, School of Horticulture, Burnley Gardens

Gladioli

THE corms of gladioli should be lifted as soon as they are mature. This stage is reached about 4 to 6 weeks after flowering. It is a good practice to lift the corms before the tops turn yellow and as a general rule they should not be left in the ground from one season to the next. If lifting is delayed it is sometimes difficult to remove all the corms and many of the cormlets will separate easily from the corm during the lifting operation. At a slightly younger stage these cormlets remain attached to the corm and can be separated during the cleaning operation.

If scattered through the garden young corms grow like weeds and frequently lead to confusion in collection of named varieties. After the corms have been lifted the leaves should be cut off about 4 inches to 6 inches above the corm. The corms are then spread out in a fine layer under shelter to dry. When dry they may be cleaned and the shrivelled remains of the old corms, which are attached to the lower side of the new corms, can be removed. Label clean corms, and, if the material is available, dust with napthalene flakes, at the rate of 1 oz. per 100 corms. This will keep insect pests away from the corms during the storage period.

Planting of Shrubs

Gardeners who desire to plant shrubs this winter should place their orders with nurserymen as early as possible. Many nurserymen have already booked up large quantities of orders and report that supplies are very limited.

Gardeners frequently find difficulty in selecting suitable shrubs for shady localities. For a light type of shade and for positions facing the east, hydrangeas will prove a very suitable subject.

There are now many good varieties of these plants — *Altona* is a medium bright blue with fringed petals, *Domotoi* is a double-flowered blue, growing to a height of about 3 feet, while *Europe* attains about the same height and has rich blue flowers with serrated petals. *Goliath* is a very hardy variety with blue petals and a taller habit of growth. In the red and pink shades *Parsival* is a rich red, dwarf-growing plant and the petals of the flowers are serrated. *King George* is a bright rosy pink and a tall strong grower. *Heinrich Seidel* is a rich carmine red with fringed petals. *Florence Bolt* is a clear soft pink. To enhance the blue colour of hydrangeas special blueing powders can be obtained from seed shops and nurserymen. These are applied to the soil in solution during the growing season.

Flowering Shrubs

Fuchsias are becoming very popular as they are good subjects for partially shaded places in the garden and grow particularly well against fences and walls facing the south. They enjoy a cool moist soil in which there is plenty of humus, this can be added to the soil by applying well decomposed manure or leaf mould, or well decomposed material from the compost heap.

Attractive features about fuchsias are that many of the tall-growing varieties can be trained against the walls and they have a long flowering season. There are many varieties available — *Balaclava* is a vigorous growing type with single heliotrope and rosy-carmine sepals. *Delvino* is another tall-growing variety with double flowers of a deep purple and carmine colour. *Mrs. E. G. Hill* is a double white flower with red sepals. *Gracilis* is a tall-growing variety with small foliage and flowers. *Fascination* is a single rose-pink variety with white sepals.

A pretty flowering shrub is *Kalmia latifolia.* It has quaintly shaped pink flowers and glossy leaves, and grows to a height of about 3 to 4 feet. It enjoys a situation similar to that for rhododendrons. The soil must be cool and moist during the summer and well drained.

Luculia gratissima a tender evergreen shrub is native to the Himalayan mountains, but it grows quite well in Victoria if given an eastern aspect sheltered from the hot north winds of summer and the cold westerly winds. Its clusters of rose-pink fragrant flowers are very spectacular. Shelter from winter frosts is necessary.

Plectranthus Ecklonii is often called the flowering coleus, and delights in the same situation as that given to hydrangeas. It will also succeed very well in more shady situations. The foliage is a good green colour and its habit of growth is very like the hydrangea. The long spikes of mauve flowers are produced in the autumn. During the winter the new growth should be cut back to a few basal buds. It is necessary to induce good strong new growth each year which will flower at its extremity.

Rhododendrons and *Azaleas* must be included in any list of plants which enjoy cool, sheltered positions with partial shade. These subjects like a rich porous, loamy soil which does not contain much lime, but which retains the moisture.

THE VEGETABLE GARDEN

Storage of Root Crops

Many gardeners will desire to store carrots and parsnips for winter use. If the garden beds are well drained, these crops may be left in the ground, but if the weather becomes very wet or the ground is inclined to retain a lot of moisture, it is better to lift these root crops, remove the tops and place them in layers with moist sand covering them. Choose a cool place and inspect the crops occasionally to prevent damage by slaters, snails, &c.

Onions

A large number of onion varieties can be planted out this month *Silver Skin, Early Barletta, Australian White Queen, Early Brown Globe* and *Odourless* are all suitable for planting now. When planting, cut off all but ½ in. of the root system. Space the rows about 10 inches apart and allow 3 to 4 inches between the plants. It is well to remember that the onion likes a friable rich soil and being a surface-rooting vegetable, it prefers the bulk of its food in the top few inches of soil. Market garden manure mixed with the topsoil at the rate of 2 or 3 ounces to the square yard a few weeks before planting will be helpful.

Seed of *Victorian Brown, Brown Spanish* and *White Imperial Spanish* may be sown in seed beds early this month. Cover the seed with about ½ in. of fine sandy soil, after firming the seed bed with the back of the spade. An important feature of onion growing is to destroy all weeds while they are very small. To attempt to pull large weeds out of the onion beds when the onions are growing disturbs the surface

[*Continued on page 231.*

Various Uses for—

APPLES AND QUINCES

By RUTH BROMFIELD, Assistant Fruit Preserving Expert

APPLES and quinces are available in abundance now and can be used to advantage in many preserves, jams jellies and chutneys.

It is not necessary to preserve Delicious Democrat, Granny Smith, Jonathan, or Stewarts' seedling apples, as they will keep throughout the winter if put in single layers on shelves in a cool airy room.

Both apples and quinces if exposed to the air after paring, will darken in colour due to oxidation and this can be prevented by placing the prepared fruit immediately into a weak brine solution (1 oz. salt to 1 quart water) until ready for processing.

The simplest way of preserving apples, not the keeping variety, is to peel, core and slice them, then place in a pan with sufficient water to prevent them from burning (syrup may be used, 4 oz. sugar to 1 pint water, if desired) and cooking until the fruit is tender (10 to 20 minutes). Then ladle the boiling pulp into sterilized containers and seal immediately.

If the fruit is preferred in sections, it should be steamed for five minutes before it is packed into the jars and overflowed with cold syrup. There will be a greater retention of Vitamin C. and because of shrinkage, more fruit can be packed into a bottle. It is also less likely to rise in the jars during processing. Process 10 to 12 minutes over boiling water.

RECIPES

Apple Marmalade

6 oranges.
9 cooking apples.
3 lemons.
9 cups sugar.
3 cups water.

Pare and slice the apples and cover with lemon juice. Wash oranges and cut into thin slices. Slice lemon rind. Add sugar and water and let stand for one hour. Cook slowly to boiling point. Boil until the mixture is of the consistency of marmalade. Bottle and seal.

Apple Cheese

Peel, core and slice, 2 lb. cooking apples. Add the rind of half a lemon and the juice of 1 lemon. To prevent the apples from sticking, add sufficient water or, if available, grape, plum or rhubarb juice and cook until tender. Rub the cooked fruit through a sieve, then weigh. To each 1 lb. of pulp, add ¾ lb. sugar. Cook slowly until the mixture is of a consistency that it will not run together when stirred. Watch carefully to avoid burning. One teaspoon ginger or cinnamon may be added if preferred.

Apple and Onion Chutney

4 lb. apples.
4 lb. onions.
2 teaspoons salt.
1 lb. raisins.
1 quart vinegar.
1 lb. brown sugar.
½ teaspoon cayenne pepper.

Put all through a mincer. Mix well, bottle and let stand for a day or two, then fill up the bottles with vinegar. No cooking is required.

Quince Cheese

2 lb. ripe quinces.
Lemon juice.

Wash the fruit, cut into quarters and remove the core. To each 1 lb. of fruit, add the juice of 1 lemon. Cook the quinces in a very little water and the lemon juice for about ¾ hour with the lid on the pan. Drain the pulp and weigh, then rub it through a sieve. Allow ¾ lb. sugar for each pound of pulp and boil together till it is so thick that it will not quickly run together when a spoon has been passed through the mass. Seal while hot.

Quince Conserve

For every 1 lb. of quinces, allow ½ pint water and ¾ lb. sugar. Peel, core and slice quinces, sprinkle overnight with portion of the sugar. Next day add the water and simmer for about an hour, then add the remainder of the sugar and boil rapidly till it responds to the setting test. The juice of a lemon to every pound of fruit is an improvement.

Preserved Quinces

Peel and cut into convenient sizes to suit preserving jars. Pack into jars, fill with cold syrup (4 to 6 ozs. sugar to 1 pint water) and sterilize 45 minutes. Overflow with boiling syrup and seal. Quinces for jam or jelly should be freshly picked and greenish yellow in colour.

Apple Juice

Cut apples into quarters and put in pan with enough water to cover. Put the lid on the pan and cook for half-an-hour, then strain. Reheat the juice to boiling point, pour into sterilized bottles and seal.

Quince Honey

5 lb. quinces.

5 lb. sugar.

1 quart water.

Boil peels and cores in water till cooked, then strain and add the grated quinces to this strained juice. Simmer 10 minutes then add the sugar, and when dissolved, boil till a good consistency (about 15 minutes).

LIVE STOCK NOTES—*continued from page 216.*

When the required stores are given at one feeding, the bees are not induced to go into brood-rearing, as is the case when the feeding is drawn out.

A good feeder known as the friction top feeder can be made from a gallon or 7 lb. treacle tin. Punch about twenty small nail-holes in the lid, and fill the can with syrup, then invert it over the cluster, inside an empty hive body.

A strong colony will empty the feeder in a few hours. The flow of feed can be regulated by the number of nail holes pierced in the lid.

All hives should carry a good waterproof and bee-tight cover. It is a good plan to tilt hives slightly towards the entrance to eliminate lodgment of water on the bottom boards.

[W. A. Collins, Apiary Inspector.]

GARDEN NOTES—*continued from page 229.*

rooting of the onion crop and checks growth. If the weeds are removed as soon as they can be handled, this check is not so great.

Beds which will not be used now should be prepared for spring crops. Spread a good layer of stable manure or well decomposed material from the compost heap over the beds and dig this material in. Then apply lime to the surface of the bed at the rate of 4 to 6 ounces to the square yard. Omit the application of lime to beds in which it is desired to plant crops of potatoes in the early spring.

Asparagus

The asparagus tops should be cut down and removed. All this organic material should be thrown on the compost heap. Fork the asparagus bed lightly so that winter rains will penetrate the soil, and the first few inches of soil can be removed and placed on other garden beds. New soil to which has been added market garden manure at the rate of 2 or 3 ounces to the square yard of bed, should be spread over these asparagus beds in the late winter.

CANDYING CITRUS PEELS

By the Fruit Preserving Expert

IT is advisable to select fruit free from skin blemishes of any kind; a scabby or damaged skin will spoil the appearance of the finished product.

Scrub the lemons thoroughly clean; then cut them through from end to end, using a sharp knife, so that the cut edges will not be roughened.

Extract the juice from the halved fruit. If a cone squeezer be used care should be taken to see that the tip or point of the squeezer does not penetrate or bruise the skin. The juice may also be preserved, and used for summer drinks and for many culinary purposes.

The lemon skins, or caps should be immersed in a solution of salt water for the purpose of extracting some of the bitterness from the skin. To make the solution allow ½ lb. salt to each quart of water, and stir until dissolved. A sufficient quantity of brine should be made to completely cover the peels. When the salt is thoroughly dissolved, pour the liquid over the caps and allow them to remain in it for several days — about a week or longer if convenient.

After salting they should be rinsed thoroughly to remove the salt, either by running water or by several changes of water. The freshened peels or caps should then be put into the preserving pan, covered with fresh water, and boiled gently until tender. Try them now and again with a cooking needle; this should penetrate them easily, but they should not on any account be allowed to become soft enough to break or fall out of shape. When they are sufficiently boiled, the pan should be removed from the heat. The peels should be lifted out, and drained on a sieve, and allowed to become cold.

Sometimes the insides of the peels are cleansed by removing the membrane and soft white pith which lines the inside of the skins; if this is desired, it is best done at this stage, as the pulp has then become soft with boiling. Gently scrape the caps with a spoon until clean, and then rinse them so as to remove any little particles adhering to them.

The peels are then ready to be put into a steeping syrup, which should be kept clean and clear. If the caps are packed one inside the other loosely they will fit into a smaller container than would be required if they were put in without packing.

There are two ways of syruping the peels. The first is to make the syrup of full strength. To do this, add 16 lb. of sugar to a gallon of water, which should then be boiled for five minutes; pour it over the peels, and allow them to steep in it for an indefinite period, but at least seven days.

The other method is to commence with a weak syrup made by boiling for five minutes 4 lb. of sugar to each gallon of water. Allow the liquid to cool to about 200 deg. F., and then pour it over the peels. Leave them to steep in this for about 24 hours. At the end of that time the syrup will be a little weaker, the peels having absorbed a certain amount of sugar from it; therefore, it will require strengthening by the addition of more sugar. To do this, the syrup should be drained off and brought to the boil, and 3 lb. of sugar added for each gallon of liquid. Boil for a few minutes, and pour again (while hot) over the peels. If the syrup is skinned during each boiling it helps to keep it clear. The syrup will need strengthening in this way on three successive days; allow the same amount of sugar each time. After the third strengthening, let the peels remain in the syrup for three or four days; then add another 3 lb. of sugar for each gallon of syrup. Therefore an interval of one day only should be allowed between each of the first three additions of sugar; then an interval of three or four days when the final 3 lb. is added. The total quantity of sugar used will be 16 lb. to

each gallon of water. By adopting the gradual process, the peel becomes permeated evenly throughout, and is generally a little more satisfactory than that put directly into the full strength syrup, although the use of the full strength liquid is a much quicker process.

The lemon peels must not be allowed to float while steeping in the syrup, but must be completely immersed the whole time.

The peel may be left in the final syrup as long as convenient, and portions may be taken when needed. It is quite as serviceable for general use when in this state as when dried and candied.

HOW TO CANDY THE PEEL

Remove the peels from the syrup, and place them on a sieve to drain. When well drained, place them on trays, and dry in a cool oven. Be careful not to scorch them. When the surface moisture has evaporated, the peels are ready for the candying. To make a candying or dipping syrup, allow 2 lb. of sugar to each pint of water, and boil to 232 deg. F. Immediately that temperature is reached, remove the pan from the fire and stir till a very slight cloudiness appears through the syrup. The operator should be careful to see that the liquid is not over-stirred.

If the pan of dipping syrup could be set inside a vessel of hot water during the dipping, the work would be more satisfactory, as an even temperature can then be maintained throughout the process.

When the syrup shows a cloudy appearance, quickly dip the dried peels in it; then place them to drain with the hollow side uppermost, so that the syrup will drain into the hollow and form the piece of candy which we usually see in the finished product. When the syrup has set, the peels should be clear, firm, and nicely coated with candy.

Orange Peel

Either the sweet or the bitter orange peel may be preserved in a somewhat similar manner to that described for lemon peel, with this difference, that the orange peel should be boiled for a less time than is necessary with the lemon. Another difference is that the Seville orange requires a longer immersion in the salt solution than does the lemon; it should be left there until the bitterness of the peel is sufficiently reduced.

Citron Peel

The citron also makes a nice candied peel. It is usually pricked through several times on each cap, so as to assist the sugar permeation. The treatment otherwise is practically the same as for the lemon.

If any peels are broken or damaged during the candying process, they should not be wasted, but may be shredded and stored for use when wanted. A mixture of orange, lemon, and citron peel makes a better flavouring than does the shredded peel of any one of the varieties.

Quick Method Candied Peel

Grapefruit

Cover with water and boil till tender. Pour off the water, cover with cold water, and boil half-an-hour. Repeat this process five times or until the peel has lost its excessive bitterness. Make a syrup of 1 lb. of sugar to 1 pint of water, bring to the boil, add the peel, and stand overnight. Next day boil the peel in the syrup to the "jelly stage," 222 deg. F. Drain the peel, roll in powdered sugar, and dry.

Orange

Use thick-skinned oranges. Make as for grapefruit, but boil with the cold water 2 or 3 times instead of 5 or 6 times.

Lemon

As for orange. Use thick-skinned lemons.

Aromatized Vinegars

By the Fruit Preserving Expert

AROMATIZED Vinegars are useful preparations to have ready prepared, and may be used to advantage in various dressings which are to be served with salads, and for fish sauces, &c., and by their use a new flavour is easily obtainable to a sauce or dressing.

The tarragon, celery, and onion vinegars are much appreciated.

Tarragon Vinegar

Vinegar is aromatized easily with tarragon by allowing one cupful of the herb to steep in a quart of vinegar for ten to twelve days, then strain the liquid through a clean fine muslin strainer, bottle, and cork for future use.

Shallot Vinegar

Remove the skins and chop the shallots finely, cover them with vinegar, and infuse for a few days, shake the bottle occasionally; afterwards strain and bottle the vinegar, keeping it well corked. Finely chopped Spanish onion may be used in place of the shallots, if preferred.

Onion Vinegar

To ½ cup chopped onion. 1 quart vinegar. 1 teaspoon salt. 2 teaspoons sugar.

Celery Vinegar

Take about 1 lb. chopped celery. ½ oz. celery seed (crushed). 1 teaspoon salt. 2 teaspoons sugar. 1 quart vinegar.

The vinegar is heated with the celery seed, salt, and sugar, and poured over the chopped celery and allowed to cool, then put into a large bottle. Shake daily for ten to fourteen days, then strain and bottle, and cork.

Horseradish Vinegar

Take about 1 breakfastcupful of grated horse-radish (if desired it may be passed through a mincer). 1 rounded tablespoon white sugar. 1 quart cider or white wine vinegar.

Scald the vinegar and pour over the horseradish, allow to steep for seven to ten days, strain and bottle.

Vinegar Making

Vinegar can be made from apples, grapes, peaches, oranges, or pears. Cull fruit from the orchard may be used; also undersized or marked fruit.

Use ripe, clean fruit. Extract the juice by crushing or pressing. Allow the juice to stand a day or two to let the sediment sink to the bottom. Cover with a double layer of cheesecloth. If a hydrometer (sugar) is available test for sugar content. The reading should be 12·5 or over. This testing is not necessary for vinegar for home consumption, although juice with less than that amount will not give a very strong vinegar.

Siphon or drain off into clean crocks or barrels for fermentation, filling only ¾ full to leave space for fermentation. Cover with cloth.

For quick fermentation a little compressed yeast cake may be mixed with the juice and added, or a little fermenting juice may be added. This addition of a starter is not essential, but hastens the process.

Stand in a warm room; about 80 deg. F., while fermentation is in progress. This process may take from six to fourteen days. It is important to allow time for the fermentation to be completed. Stir daily during this period.

Strain off the clear portion into clean crocks for ascetic fermentation. If allowed to stand, the juice will gradually turn into vinegar, but the process is hastened by the addition of a vinegar starter, one part of good strong vinegar being added to four parts of juice.

Cover the crock with a lid to allow the process to continue in the dark. After from three to eight days a scum begins to form. This scum must not be interfered with and must remain on the surface. A raft of sticks is sometimes used if the scum-mother of vinegar begins to sink.

Allow vinegar to stand three to six months until it is sufficiently strong. Strain through flannel, bottle, pasteurize at 160 deg. F., seal and store in a cool dark place.

Licensed Skin Buyers

Sheep Owners Protection Act

The following is a list of persons licensed under the Sheep Owners Protection Act, to buy raw sheep skins. The licences have effect until the 31st December, 1944 :—

Licence No.	Holder of Licence.	Address.
1768	Allan, J. R. ..	19 King-st., Melbourne
1760	Angliss, W., and Co. (Aust.) Pty. Ltd.	42 Bourke-st., Melbourne
1775	Austin and Ford Pty. Ltd.	Hopetoun
1905	Australian Central Woolgrowers and Realisation	590–594 Little Bourke-st. Melbourne
1761	Banks, C. L. ..	Barkly-st., Ararat
1879	Bartlett, A. E. ..	High and Warren sts., Echuca
1759	Barrett, H. L. ..	12 Bond-street, Sale
1773	Bennett, S. C. ..	71 Isabella-st., Geelong West
1762	Berman, D. ..	395 St. Kilda-st., Elwood
1898	Black, S. B. P. ..	129 Albert-st., Ballarat
1763	Biggs, H. A. and Son	Korumburra
1772	Borthwick, Thos. and Sons (A'asia.) Ltd.	84 William-st., Melbourne
1771	Bourke, D. ..	89 Cox-st., Hamilton
1767	Brooks, Mrs. E. J.	Guthrie-st., Quambatook
1899	Brown, C. ..	Stanhope-rd., Rushworth
1914	Bunn, W. G. ..	South-rd., Warragul
1776	Burns and McCleve	206 Mair-st., Ballarat
1885	Burrows, A. ..	Scoresby-st., Kerang
1911	Burton Stores Pty. Ltd.	Binney-st., Euroa
1770	Butler E. and Sons	Tallangatta
1888	Byerley, H. M. ..	77 Carrington-st., Adelaide, S.A.
1766	Callan, P. J. and Sons	6–8 Moorabool-st., Geelong
1765	Canfield, E. F. ..	Rochester
1764	Carlile, T. H. ..	Watson-ter., Mt. Gambier, S.A.
1769	Cary, W. A. ..	High-st., Heathcote
1774	Cass, R. ..	Chetwynd
1801	Claffey, A. S. ..	Taverner-st., Rainbow
1925	Clarke, J. T. ..	160 Firebrace-st., Horsham
1830	Collins, H. G. ..	Kaniva
1802	Cook, T. J. ..	Black-st., Terang
1803	Cook, W. J. ..	Allansford
1804	Cooke, E. J. ..	McKenzie-st., Murrayville
1908	Cooper, A. S., Pty. Ltd.	87 Lambeth-st., Kensington
1875	Coulstock, K. ..	65 Welshford-st., Shepparton
1882	Coulstock, T. R. A.	Allan-st., Kyabram
1890	Crosthwaite, I. S.	Rosebery
1805	Dallimore, P. J...	Brook-st., Camperdown
1881	Devine, P. and Co.	McDonald-st., Numurkah
1909	Dillon, V. G. ..	Manangatang
1842	Dimboola Stores Ltd.	Lochiel-st., Dimboola
1806	Downes, A. J. ..	Ritchie-st., Dunkeld
1892	Duggan, T. A. ..	Mollison-st., Kyneton
1891	Eales, F. ..	Bell-st., Penshurst
1915	Edgecombe, J. H.	Hannon-st., Sea Lake
1843	Egan, B. F. ..	Henty-st., Portland
1889	Egan, F. ..	High-st., Avoca
1779	Einsiedel, E. B. ..	8 Yendon-rd., Glenhuntly
1831	Elias, A. P. ..	Martin-lane, Tallangatta
1844	Ellis, C. J. ..	Euroa
1906	Erwin, V. P. ..	Lake-st., Natimuk
1780	Evans, C. J. ..	83 French-st., Hamilton
1901	Evans, W. J. ..	Boort
1845	Ferguson, F. S. McN.	Market Square, Bendigo
1880	Flanigan, J. ..	Murray-st., Colac
1846	Freeman Bros. ..	Scott-st., Warracknabeal
1781	Freeman, W. G...	Hervey-st., Elmore
1923	Gadd, M. C. ..	Walwa
1807	Gelbart, J. M. ..	20 Wilson-st., North Carlton
1782	Gordon, C. G. ..	645 Spencer-st., Melbourne
1894	Gorton, C. H. ..	Vickery-st., Alexandra
1863	Green, Thos. W., and Co. Pty. Ltd.	Therry-st., Bombala, N.S.W.
1808	Greig, J. W. ..	Ouyen
1883	Hallam, F. W. ..	McCollouch-st., Donald
1847	Hardy, F. A. ..	Myamyn
1784	Hargreaves Bros. Pty. Ltd.	High-st., Ararat
1783	Hargreaves, J. R.	Terang-rd., Mortlake
1848	Harper, W. ..	Alberton
1809	Harris, A. J. ..	19 Bowen-st., Warragul
1878	Harris, L. ..	Lower Main-st., Stawell
1785	Haughton, Wm., and Co. Pty. Ltd.	545 Little Collins-st., Melbourne
1921	Heddle, R. M. ..	Kerang
1849	Hegerty, W. J. ..	Charing Cross, Bendigo
1851	Hicks, J. T. ..	Goroke
1832	Hill, D... ..	6 Phillips-st., Warracknabeal
1810	Holdsworth, W. ..	Beaufort
1904	Hould, R. J. ..	Byrne-st., Stawell
1867	Howard, E. J. ..	Wood-st., Donald
1910	Howard, J. H. ..	Commercial-st., Korumburra
1811	Howlett, A. E. ..	Robertson-st., Casterton

Licence No.	Holder of Licence.	Address.
1786	Jackson, J., Pty. Ltd.	Main-st., Bairnsdale
1778	James, D. ..	199 Boundary-rd., North Melbourne
1859	Jobe, C. E. ..	Lower Main-st., Stawell
1833	Johnson, A. P. ..	Station-st., Lake Boga
1896	Jones, A. ..	Bombala-st., Delegate, N.S.W.
1872	Jones, E. V. ..	Harrow
1812	Kennon, J., and Sons Pty. Ltd.	River-st., Richmond
1834	Kewin, R. F. ..	Wheeler-st., Corryong
1850	Khan, B. ..	Market Square, Bendigo
1866	Kilroy and Story	Heathcote
1813	Lindsay, D. ..	Charles-st., Jeparit
1814	Lockwood, J. E...	Birchip
1871	Long, C. J. ..	12 Campbell-st., East Kew
1918	Love, J. D. ..	Queen-st., Bombala, N.S.W.
1815	McClintock, A. E.	Digby
1897	McColl, D. ..	Tatura
1835	McDonald, I. A...	Corryong
1787	McLean, A., and Son	Smythe-st., Benalla
1816	McLennan, D. ..	Prospect-st., Wycheproof
1817	McLennan, D. J., and Son	Sea Lake
1836	Marshall, G. J. ..	Edenhope
1903	Moore, R. D. ..	Hamilton-st., Kilmore
1873	Murrell, H. ..	Murray-st., Casterton
1865	Murrells and McNicol	St. Arnaud
1837	Nicklen, T. E. ..	Talbot-rd., Maryborough
1788	Niddrie, L. G. ..	27 Lonsdale-st., Hamilton
1818	North Western Wool and Skin Stores	Gummow-st., Swan Hill
1789	O'Beirne, J. and F.	Linton
1855	O'Beirne, J. D. ..	Horsham
1870	Oppenheim, W. ..	21 Peel-st. north, Ballarat
1856	Parker, S. K. ..	Hovell-st., Wodonga
1886	Payne, A. ..	Nyah West
1913	Peach, A. C. J. ..	Macarthur
1864	Penney, H. ..	422 Ascot-st., Ballarat
1790	Perkins, C., Pty. Ltd.	Mt. Gambier, S.A.
1819	Perkins, C. T. ..	Naracoorte, S.A.
1820	Perry, A. J. ..	Princes Highway, Colac West
1853	Pettit, W. B. ..	McMahon-st., St. Arnaud
1857	Phillips Co-operative Society Ltd. (in Liquidation)	Main-st., Minyip
1821	Phillips, T. J. ..	Mologa
1791	Pickthall, J. W...	Silvermines-road, St. Arnaud
1852	Pyramid Co-operative Society Ltd.	Pyramid Hill
1792	Quarrell, C. ..	Cobden
1838	Reason, C. T. ..	Pekin-rd., Maryborough
1793	Rehfisch, H. K. ..	223 Mair-street, Ballarat
1794	Rice, J. W. ..	20 Doveton-st., Ballarat
1861	Rice, W. T. ..	Bombala, N.S.W.
1795	Rich and Gross ..	Brougham-pl., Geelong
1912	Richards, E. R. ..	North-western-rd., St. Arnaud
1895	Robbins, T. ..	Cohuna
1919	Robertson, C. N.	9 Little Provert-st., North Melbourne
1839	Ross and Brewster Pty. Ltd.	1 Little Curran-st., North Melbourne
1893	Ross, J. A. ..	Walwa
1822	Rowan, Miss L. M.	Main and Church sts., Minyip
1902	Ruedin, U. F. ..	Holdsworth-rd., Long Gully, Bendigo
1840	Russell, R. ..	Colac West
1868	Sharrock, C. H. ..	Bessiebelle
1823	Short, I. W. ..	George-st., Hamilton
1824	Sims, Cooper (Freezing Works) Pty. Ltd.	31 Queen-st., Melbourne
1841	Sly, C.	Walpeup
1796	Stanton, J. ..	Nelson-st., Nhill
1874	Stephens, J. ..	Murray-st., Colac
1907	Stone, G. ..	Main-st., Cohuna
1854	Sutton, J. S. ..	Beaufort
1825	Taylor, H. G. ..	Birchip
1797	Teasdale, R. L. ..	High-st., Charlton
1777	Tellie, N. ..	Rosebery
1916	Thomas, S. S. ..	Wattle and Victoria sts., Bendigo
1924	Thomas, T. ..	Tintaldra
1826	Trigger, M. E. ..	Punnaroo, S.A.
1877	Venables, C. A ..	Alberton
1862	Vines, A. A. ..	Robinvale
1900	Voges, A. ..	Hamilton
1922	Waddington, L. H.	Commercial-rd., Yarram
1920	Walker, Arch. ..	Government-rd., Mooroopna
1827	Warnock, R. W...	High-st., Yea
1869	Waters, S. H., and Co. Pty. Ltd.	514 Little Collins-st., Melbourne
1887	Westphalen, W. R.	Yaapeet
1798	Wheatland, W., and Co.	Brougham-pl., Geelong
1799	Wheaton, C. M. ..	Miram
1860	Wilkinson, G. R.	Manangatang
1828	Wingfield, Miss E. H.	Charlton
1917	Wood, H. L. ..	Balmoral
1829	Wright, N. A. ..	140 Swallow-st., Shepparton
1858	Young, H. ..	Orford
1884	Young's Blue Store Pty. Ltd.	Cumming-av., Birchip
1876	Zed, A., and Sons	Commercial-st., Mt. Gambier, S.A.

Tubercle-free Herds

ACCREDITED TUBERCLE-FREE HERDS.

The following herds have been declared free of tuberculosis under the *Accredited Tubercle-free Herd Scheme* conducted by the Department of Agriculture. Under this scheme a tubercle-free accredited herd of cattle is one in which the entire herd has passed two negative, successive, annual physical examinations and tuberculin tests, or upon disclosure of infection, three semi-annual, successive physical examinations and tuberculin tests applied by a State Veterinarian or by a qualified and registered veterinarian who is approved by the Chief Veterinary Inspector for that purpose.

Name.	Address.	Number in Herd.	Name.	Address.	Number in Herd.
Ballarat Orphanage	Ballarat	135	Maloney P. J.	Tongala	66
Banyule Stud Pty. Ltd.	Wangaratta	31	McNabb and Son, G. A.	Irrewillipe East	154
Black, I. S., Estate	Mount Noorat	53	Nancarrow Bros.	Kerang	52
Clarke, A. B.	Glenormiston South	15	Noonan, G.	Benalla	30
Dennis, Mrs. A. A.	Frankston	42	Noonan, Mrs. S. A.	Benalla	35
Dookie Agricultural College	Dookie	85	Northcote Children's Farm	Bacchus Marsh	156
Dunbar and Clark, Messrs.	"Hazeldean Dairy," Mount Dandenong	18	Onley, W. H.	"Glenholme," Caldermeade	64
Geelong Grammar School	Corio	68	Parker, Mrs. L. M.	Tallarook	56
Gibson, Mrs. C. S.	"Sweeney's," Eltham	35	Payne, A. E. T.	"Yarra View," Lilydale	63
Gorman, A. W.	"Cathcart," Alexandra	57	Payne, T. E. N.	"Woodburn," Kilmore	46
Griffiths, J. G.	Benalla	121	Poole, M. A. and D.	Caldermeade	134
Henry, J. A.	Warrnambool	41	Poole, M. A. and D.	Yannathan	72
Hollaway, R. W.	Caldermeade	75	Powell, T. S.	"Carellen," Mansfield	46
Howlett, Mrs. G. and Miss E. Samuel	Lang Lang	55	Richardson Bros., Messrs.	"Faldinghurst," Upper Beaconsfield	30
Jakobi, L. W.	"Granada," Yannathan	80	School of Horticulture	Burnley	6
Kane, F. E.	Warrnambool	28	State Experiment Farm	Rutherglen	37
Kilmany Park Farm Home for Boys	Sale	104	State Research Farm	Werribee	229
Lawrence, P. H.	"Rainga," Tarrawarra	67	Stephens, Dr. F.	Vermont	32
Longerenong Agricultural College	Dooen	43	Vagg, T. E.	Officedale	45
			Wells, W. G.	Caldermeade	65

In addition to the above-mentioned, the herds set out hereunder may be considered free of tuberculosis. All these herds have given negative reactions to two or more successive tests conducted by departmental veterinary officers, but inasmuch as replacement cows are only submitted to one test before being admitted to the herds they cannot be considered as accredited under the accreditation scheme which requires, among other things, that no cow shall be admitted to the herds unless it has given two (2) negative reactions at an interval of 60 days, and must be kept in isolation during the period between the two tests.

Name.	Address.	Number in Herd at Last Test.	Name.	Address.	Number in Herd at Last Test.
Abbey, S. G.	Mernda	7	Brady and Cunningham	Doncaster	21
Alexander, Miss R.	Ballarat East	1	Bray, Mrs. O. C.	Glenroy	34
Anderson, A. R.	Craigieburn	123	Brereton, E.	Kennington	25
Anderson, Mrs. N. J.	North Geelong	18	Brock, J. N.	Epping	16
Anderson, J. B.	Warrnambool	19	Browell, L.	Golden Square	15
Andison, J. A.	Thomastown	46	Brown, J.	Geelong West	7
Andrew, T. S.	Whittlesea	91	Brown, Mrs. A.	Malden Gully	11
Andrew, W.	Whittlesea	123	Brown, R.	Kennington	4
Andrews, E. H.	Templestowe	19	Brownhill, C. E. H.	Bundoora	34
Angliss, Mrs. R.	Ballarat	1	Bryden, A. C.	Bendigo	17
Angus, W.	Moolap	6	Bumpstead, K.	Moolap	10
Armstrong, Mrs. M. A.	Sebastopol	15	Bunting, J.	Craigieburn	34
Artley, A.	Sebastopol	11	Bunting, J.	Epping	30
Atkinson, A.	Cambrian Hill	21	Burke, T. S.	Huntly	19
Atkinson, V.	Cambrian Hill	26	Burns, D.	Moolap	8
Baglin, E.	Wallington	41	Butler, W.	Wallan	69
Bailey, Mrs. A.	Doreen	11	Callaghan Bros.	Thomastown	66
Baker, A.	Bannockburn	32	Callaghan, L.	Epping	28
Barclay, A. H.	Whittlesea	93	Cameron Bros.	Belmont	67
Barker, Mrs. E. M.	Huntly	11	Campbell, K.	Broadmeadows	102
Bates, D. S.	Whittlesea North	25	Campbell, R. C.	Moolap	54
Bates, J.	Connewarre	21	Cardwell, E. F.	Whittlesea	62
Batten, R. J.	Wollert	51	Carroll, M.	Fyansford	28
Bellis, Mrs. A.	Fyansford	15	Carr, G.	Leopold	20
Benson, R.	South Morang	35	Carr, W. J.	Wollert	62
Bickley Bros.	Wollert	64	Carter, R. H.	Fyansford	23
Bingley, R. P.	West Geelong	31	Cavagna, Miss	Sedgwick	7
Blackmore, P. J.	Ballarat North	57	Challis, L. J.	Connewarre	57
Blood, J.	Ballarat	8	Child, G. P.	Epping	54
Booth, Mrs. A.	Warrandyte	7	Chiminello, A.	Epping	35
Bourke, G. J.	Fairfield	82	Christian Bros.	Doreen	42
Bourke, J. W.	Somerton	37	Clark, H. M.	Nerrina	18
Bourke, W. J.	Alfredton	26	Clark, P. W.	Whittlesea	58
Bradbury, A. K.	Diamond Creek	50	Clark, W. and T.	Kal Kallo	68
Bradbury, G.	Kangaroo Flat	20	Clemence, S.	Warrenheip	23

Name.	Address.	Number in Herd at Last Test.
Cochrane, C.	Ballarat North	31
Collins, L.	Doreen	48
Cooke, S. J.	Belmont	38
Cornfoot, D. H.	Whittlesea	43
Coulter, G.	Ballarat North	19
Coulthard, J. J.	Whittlesea	76
Crack, Mrs. E.	Bendigo	12
Craker, Mrs. E.	Warrandyte	2
Cross, G. A.	Mount Rowan	22
Crowe, P.	Gnarwarre	20
Crowle, A. J.	California Gully	16
Cuddihy, T. D.	Lovely Banks	26
Cumming, H. R.	South Morang	23
Cupris, A.	Bullock Creek	31
Curtis, W.	Wallington	35
Danaher, J. V.	Whittlesea	70
Danns, N. C.	Whittlesea	27
David, Mrs. M.	Ballarat	2
Davies, A. H.	Drysdale	20
Deutscher, H. W.	Mernda	155
Devereux, Mrs. A.	Ballarat	3
Dickinson Bros.	Sebastopol	54
Dillon, L. W.	Epsom	18
Doggett, T.	Kangaroo Flat	17
Douglas, Mrs. J.	Alfredton	52
Downing, J.	Canadian	5
Draper, L. S.	Wollert	35
Drysdale, J. C.	Warrandyte	41
Duke, J.	Ballarat East	1
Dunstan, W.	Pascoe Vale	32
Dwyer, F.P.	Greensborough	40
Eckersley, W. H.	Alfredton	40
Edwards, S. R.	Sebastopol	14
Elford, S.	Magpie	34
English, N. J.	Donnybrook	47
Evans, G. W.	Highton	15
Faderson, J. H.	Mandurang	108
Fairbrother, J. E.	North Geelong	33
Fergusson, M. A.	Whittlesea	115
Ferres, Mrs. M. E.	Mount Clear	21
Fitzpatrick, W.	Mandurang	9
Fitzgerald, D.	Leopold	45
Fitzsimons, B.	Lower Templestowe	33
Flanagan, A. D.	Epsom	10
Flynn, O.	Epsom	21
Fox, A.	Mernda	68
Franklin Bros.,	Sebastopol	29
Franklin, F. M.	Sebastopol	15
Friswell, H.	Bendigo	42
Galbraith and Walker	Greensborough	31
Gallagher, J.	Golden Square	20
Gallus, E. H.	Doncaster	14
Gamble Bros.	Greenvale	153
Gardiner, A. M., Estate of	Whittlesea	91
Gardiner, C. E.	Epping	29
Gargan, M. J.	Marshall	43
Gentner, H.	Eaglehawk	9
Gerrett, W. T.	Ballarat North	19
Gibbs, C.	Arthur's Creek	30
Gillies, N.	Diamond Creek	32
Godfrey, W. and W.	Moolap	42
Goulden, J. B.	Wilson's Reef	54
Graff, Mrs. M. G.	Mernda	21
Graham Bros.	Whittlesea	27
Gray, J. H.	Herne Hill	74
Green, J.	Eppalock	15
Green, R.	Leopold	27
Green, W.	Mernda	7
Greer, A.	Wollert	32
Grinter Bros.	Whittington	52
Grinter, T.	Whittington	33
Guidice J. J.,	Kangaroo Flat	17
Gunn, A. J. B.	Ballarat	7
Gunn, W.	Kangaroo Flat	10
Hall, Mrs. J. E.	Whittlesea North	9
Hamilton Bros.	Huntly	17
Hancorne, Miss M. R.	Yan Yean	34
Hanrahan, Miss E.	Sebastopol	4
Hanrahan, N.	Sebastopol	6
Hargreaves, W.	Emu Creek	10
Harmer, L. T.	Thomastown	44
Harrison, H. N.	Ballarat	17
Hawkes, Miss D.	Warrandyte	21
Hayes, J. J.	Smythe's Creek	6
Hedges, J. T.	Ballarat	9
Hehr, R.	Wollert	34
Henderson, J.	Donnybrook	58
Henshaw, E.	Lower Templestowe	9
Henshaw, Miss A.	Templestowe	18
Hewitt, C. J.	Wattle Glen	7
Hewitt, H.	Ballarat	13
Hickinbotham, Miss N.	Whittington	10
Higgs, R. N.	Yan Yean	76
Hilderbrand, P.	Sebastopol	21
Hill, H.	Campbellfield	48
Hill, J.	Somerton	86
Hill, W.	Somerton	39
Hinchcliff Bros.	Whittington	74
Hogan, Miss M.	Cambrian Hill	20
Hobbs, Mrs. F. J.	Doncaster East	5
Hocking, A. R.	Canadian	12
Hoctor, J. and Son	Greenvale	34
Hooper, A.	Moolap	15
Hose, W. J.	Grovedale	33
Houlahan, P.	Eppalock	40
Houlahan, T. J.	Eppalock	43
Hoy, T.	Kennington	26
Huggins, R. E.	Ballarat	1
Hughes, Mrs. R. E.	Ballarat East	14
Hutchinson, J. B.	Drysdale	23
Jackson, Mrs. M. A.	Heidelberg	11
Jackson, Mrs. M.	South Warrnambool	6
Janefield Farm	Bundoora	43
Jeffrey, J. T.	Mernda	93
Jenkins, Mrs. A.	Mount Rowan	22
Jenkins, T. H.	Whittlesea	22
Jinks, J.	Curlewis	43
Johnstone, Miss J. A.	Mernda	12
Jones, I.	Lovely Banks	43
Jones, S. E.	Campbellfield	23
Jones, S. G.	Epsom	13
Jukes, C.	Epping	42
Jukes, W. H.	South Morang	28
Junor, G. M.	South Morang	56
Kane, F. E.	Warrnambool	28
Kell, W. E.	Greensborough	28
Kerr, J.	Mandurang	7
Kerwin, H. E.	Eaglehawk	21
Kilpatrick, E.	Mernda	89
Kinnersley, F. and Son	Wendource	19
Kirkwood, S.	Eaglehawk	12
Knight Bros.	White Hills	42
Knight, G. A.	Sebastopol	29
Knowles, J. T.	Ballarat	3
Lacy, G. C. and Son	Cambrian Hill	32
Lacy, N. C.	Cambrian Hill	13
Lane, J.	Warrnambool	9
Latta, Mrs. J.	Warrnambool	6
Lawry Bros.	Tandara	113
Lehmann, A. H.	Epping	36
Levett, E.	Warrnambool	12
Leviston, A. E.	Ballarat East	25
Leviston, G.	Ballarat East	9
Lewis Bros.,	Beveridge	64
Lincoln, Mrs. L. M.	Portarlington	46
Littlejohn, E.	Grovedale	22
Lloyd, W. M.	Mickleham	6
Lodington, Mrs. I. E. M.	Ballarat	8
Longuchaye Bros.	Point Lonsdale	32
Love, J. E.	Strathfieldsaye	16
McAllister, K.	Whittington	36
McCormack, D.	Woodstock	59
McCormick, T.	Geelong West	24
McCulloch, A. A.	Warrnambool	28
McDonald, F.	Queenscliff	63
McDonald, Mrs. M.	Belmont	14
McDonald, N.	Highton	21
McDowell, R. H.	Greensborough	26
McGregor, W. B.	Mernda	44
McKay, J. M.	Wallan	70
McKay, L.	Kal Kallo	13
McKay, Miss E.	Donnybrook	51
McKay, Mrs. H. E.	Ballarat South	10
McKendry, J.	Doreen	69
McKenzie, D. I.	Marong	95
McLean, J. F.	Bundoora	32
McManus, D. J.	Napoleons	18
McManus, J. W.	Napoleons	14
McPhee, K.	Whittlesea	106
McPherson, A.	Yan Yean	82
McQuarie, J. C.	Mickleham	12
Mahood, J. E.	Purnim	113

Name.	Address.	Number in Herd at Last Test.
Malcolm, W.	Drysdale	31
Maltzahn, Mrs. E. N.	Campbellfield	45
Mannes, W.	Strathfieldsaye	39
Martin, Miss A.	Napoleons	21
Martin, Miss G.	Ballarat	11
Martin, W. B.	Ballarat	20
Mashiter, T. R.	Greenvale	60
Mason, Arthur	Donnybrook	62
Mason, N.	Donnybrook	60
Maskell, E.	Fyansford	28
Mathieson, A.	Whittington	25
Matthey, A. J.	Bannockburn	111
Maxwell, J.	Whittlesea	32
Mays, Mrs. A. M.	Doncaster	6
Meiling, T.	Kennington	16
Menhennett, F. W.	Sebastopol	21
Mercer, H.	Long Gully	18
Millar, Mrs. G.	Smythe's Creek	51
Miller, A. J.	Whittlesea North	50
Miller Bros.	Greensborough	44
Miller, D.	Epping	42
Moller, C.	Wallington	33
Moller, H.	Leopold	38
Moore, R. G.	Moolap	23
Morris, C.	Sebastopol	28
Morris, E. J.	Huntly	19
Mortimore, S.	Epping	29
Mosig, H. C.	Epping	23
Murfet, Mrs. S.	Huntly	21
Nankervis, L.	Mandurang	15
Nash, A.	Corio	44
Nash, H. A.	Tullamarine	42
Nebel, Mrs. A. E.	Thomastown	36
Nelson, D.	Highton	58
Nestor Bros.	Wendouree	40
New, H. G.	Craigieburn	15
Nickols Bros.	Tandara	72
Noonan, J.	Sedgwick	50
Notman, J.	Reservoir	68
O'Dell, J. E.	Ballarat East	21
O'Donnell, P.	Wendouree	38
O'Gorman, A.	Craigieburn	67
O'Halloran, J.	Sebastopol	28
O'Hern, T.	Epping	61
O'Keefe, J. P.	Warrnambool	21
Oliver, E. J.	Mickleham	32
Oliver, W.	Campbellfield	72
Olliver, Mrs. S. E.	Ballarat	14
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Patullo, F. E.	Mickleham	31
Payne, A.	Tullamarine	23
Pearce, A. E.	Mandurang	55
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Pegg, W. E.	East Geelong	6
Pentland, E.	Maiden Gully	8
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Rawlings, J. H.	Whittlesea North	31
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Renfrey Bros.	Drysdale	11
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Renkin, R.	Ballarat East	11
Richards Bros.	Leopold	56
Richards, T.	Ballarat	29
Richards, W. J.	Warrenheip	20
Richardson, C.	Curlewis	45
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Richen Bros.	Moolap	47
Riley, P.	Curlewis	50
Roche, Mrs. S. M.	South Morang	97
Rodgers, E.	Whittlesea North	14
Rosewarne, Miss P.	Yan Yean	49
Rowe, Mrs. M.	Eaglehawk	19
Ruff, A.	White Hills	12
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Salathiel, R. W.	Big Hill	14
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Seeber, B.	Thomastown	28
Semmens, J. H.	Sedgwick	18
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Sheahan, J.	Templestowe	30
Shearer, G.	Warrenheip	18
Shearer, J.	Warrenheip	11
Sheeky, A. A.	Templestowe	24
Siebel, F.	Thomastown	29
Slorach, J.	Whittlesea	29
Smirfitt, J. E.	Epping	52
Smith, F. A.	Invermay	15
Smith, H. H.	Heidelberg	33
Smith, J. R.	Mernda	28
Smith, L. W. W.	Bundoora	81
Smith, M.	Heidelberg	43
Smith, R. A.	Epping	35
Smith, S. E.	Epping	33
Smith, S. H. A.	Yan Yean	17
Sobey Bros.	Napoleons	66
Somerville, A.	Strathfieldsaye	15
Somerville, J.	Strathfieldsaye	14
Somerville, M.	Strathfieldsaye	15
Somerville, P.	Strathfieldsaye	23
Somerville, W.	Strathfieldsaye	48
Southon, H. W.	South Morang	60
Spedding, Mrs. S. A.	Ballarat North	5
Spruzen, G.	Wollert	41
Stacey, H. W.	Connewarre	60
Stacey, R.	Warrenheip	29
Stenning, R., Estate of	Wollert	34
Stephens, H.	Epping	10
Stevenson, E.	Wendouree	35
Stimson, T.	Woodstock	34
Story, A. E.	Emu Creek	36
Story, T.	Mandurang	24
Stuart, W. A.	Black Hill	3
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Swanton, Mrs. C.	Invermay	41
Synot, C.	Fyansford	23
Thomas, Mrs. E.	Broadmeadows	10
Thomas, J.	Mandurang	39
Thomas, Mrs. V. E.	Yan Yean	17
Thompson, A. E.	Sebastopol	3
Thompson H.	Whittington	35
Thompson Bros.	Connewarre	21
Thompson, W. B.	Moolap	93
Toman, Mrs. A.	Golden Square	15
Tomkins, I.	Belmont	14
Tomkins, Mrs. E.	Moolap West	19
Toshack, H. J.	Wendouree	38
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Trigg, Mrs. A.	Breakwater	20
Troutbeck, H. R.	Mickleham	39
Tuddenham, F. T.	Cherry Tree	19
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Twomey, A.	Greenvale	39
Tyrell, H. S.	Marcus	58
Underwood, V. D.	Alphington	13
Vallence, C. A.	Epping	19
Vearing, E.	Epping	6
Vernon Estate	Cherry Tree	46
Vincent, Mrs. A.	Warrenheip	19
Wallace, R.	Breakwater	24
Wall and Faulkner	Marshall	77
Waller, R.	Ballarat	26
Walsh, B.	North Geelong	39
Walsh, C. J.	Yan Yean	7
Warner, K.	Batesford	33
Warren, E. and T.	Moolap West	36
Warren, S.	Moolap West	26
Watkins, F.	Campbellfield	71
Wheeler, W. A.	South Morang	34
Whelpton, B.	Whittlesea North	88
White, L. and S.	Alfredton	53

Name.	Address.	Number in Herd at Last Test.
White, T. L. R.	Alfredton	53
White, W.	Greensborough	17
White, W. H.	Ballarat West	17
White, W. H.	Smythe's Creek	57
White, W. J.	Alfredton	18
Whitelock, E. A. and E. J.	Epsom	23
Whitfield, A. E.	Bendigo	6
Whittingham, E. W.	Greensborough	33
Wicks, C.	Golden Square	18
Wiffin, W.	Bellarine	54
Wightman, T. A.	Ballarat East	11
Williams, E. A.	Thomastown	32
Williams and Berryman	Bendigo	15
Williams, Mrs. N.	Tullamarine	40
Williamson, E. H.	Batesford	39
Williamson, H.	Greenvale	19
Williamson, J.	Doncaster (High-st.)	4
Willis Bros.	Craigieburn	54
Wills, R. G.	North Geelong	23
Wilson, J. E.	Diamond Creek	9
Wilson, J. H.	Eltham	3
Wilson, Mrs. M.	South Morang	12
Wooster, G. S.	Watsonia	23
Wrest, W.	Epping	93
Wuchatsch, J. D.	Epping	17
Yann, R.	Wollert	52
Young, A.	Queenscliff	18
Young, J. A.	Sedgwick	39
Young, R. L.	Wollert	26
Young, W. S.	Sedgwick	54
Ziebell, H.	Thomastown	40

In addition to the above herds, there are 539 head of cattle on 96 properties supplying milk to Benalla, that have passed two successive negative tests.

There are also 574 herds in which 12,279 head of cattle have passed one test, and may be considered, therefore, to be in process of becoming tubercle-free herds.

Certified Pullorum Tested Flocks

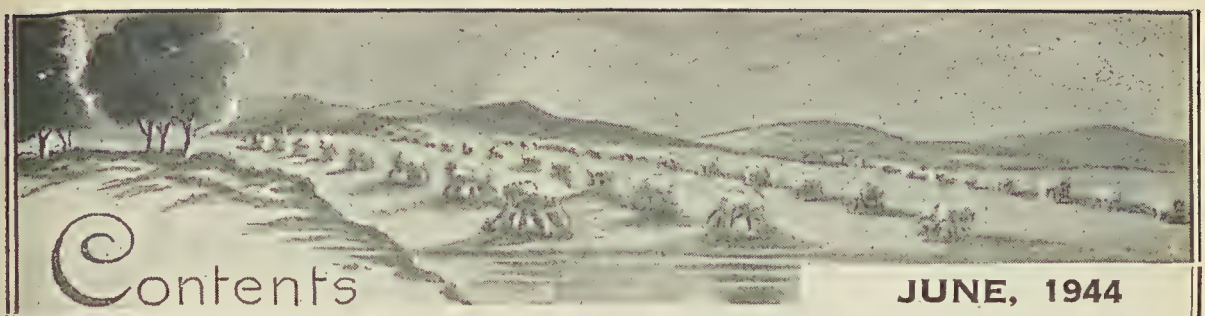
A certified Pullorum Tested Flock is one in which all the breeding stock have given a negative reaction to the agglutination test for pullorum disease, and in which all such stock are kept under rigid conditions of isolation approved by the Chief Veterinary Inspector.

The undermentioned flocks have been certified by the Department of Agriculture, and will remain so until the next breeding season or until such time as the Chief Veterinary Inspector determines.

Full particulars of this scheme appeared in the February, 1942, issue of the *Journal of Agriculture.*

Application forms are obtainable from the Chief Veterinary Inspector, Department of Agriculture, Melbourne, C.2.

Owner.	Number of Birds.
Bentley, F. W., Hastings-road, Frankston	1,080
Davidson, A., 22 Sherbrooke-avenue, Ringwood	98
Dawson, R. G., Maldon-road, Castlemaine	504
Emmott, J. T., Verdun-street, Inglewood	212
Everard, H. L., Hawkesdale	422
Forbes, Mrs. R., Pental Island, c/o Swan Hill P.O.	294
Gartner, Miss M. T., 259 Middleboro-road, Box Hill	56
Giovanetti, G. E., Skene-street, Kennington, Bendigo	98
Graham, C., "All Black Poultry Farm," Portarlington	45
Grant, D., 6 Laurel-grove, Blackburn	63
Greenshields, E. J., Lancefield	431
Hall, R. H., Wal Wal	370
Hamilton, A., "Lyncroft", Flinders	321
Hayes, R., Mt. Dandenong-road, Montrose	217
Hemphill, A. E., "Glenara Poultry Farm", Monegeeta	521
Henderson, C. W., Shepparton East	448
Lawrie, Mrs. M., 107 Albert-street, Sebastopol	231
Maher, Allan E., "Alandale", Wal Wal	772
Maclean, Charles C., Kelvinside-road, Noble Park	125
Moller, F. C., Warburton-road, Lilydale	48
Molson, W. E., 188 Blackburn-road North, Blackburn	649
Mumford, L. J., Steele-street, Healesville	348
Rae, J., 277 Albert-street, Sebastopol, Ballarat	720
Ridgway, Geo., Callander-road, Noble Park	155
Robbins, R. B., Derby	83
Salmond, J. B., Deer Park	120
Sanders, A., Stud-road, Wantirna	373
Scouller, R. C., Tarrant-street, Cobden	243
Shipp, R., P.B., Kerang	402
Skinner, Mrs. M. F., Princes-highway, Noble Park	73
Spry, W. P., "Esswill", Culgoa	707
Sutcliffe, W., 71 Botanic-road, Warrnambool	33
Sweeney, J. J., Tarara Stud Poultry Farm, 55 Rundle-street, Ararat	401
Taylor, E. D., Walker-street, Sebastopol	846
Walker, Mrs. E. H., Lancefield	173
Williams, V., Wangaratta Hatchery, Wangaratta	605
Wohlers, S., Jung	377



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Issued by direction of the Hon. N. A. Martin, M.L.A., Minister of Agriculture.

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The Journal is issued monthly. The subscription, which is payable in advance and includes postage, is 3s. per annum for the Commonwealth and New Zealand, and 5s. for the United Kingdom and Foreign Countries. Single copy, Threepence. Subscriptions should be forwarded to the Director of Agriculture, Melbourne, C.2.

POSTAGE RATES

The postage required for this issue is:—To Australia and New Zealand, 1½d.; to United Kingdom, 2½d.; to United Kingdom via All-sea route, 1½d.; to other British Possessions, 2½d.; to U.S.A. and Foreign Countries, 3½d.

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Results of 1943 Trials

By W. D. ANDREW, M.Agr.Sc., Agrostological Research Officer

THE products from pastures are urgently needed by the civilian population of Great Britain and by our fighting forces throughout the world, and it is becoming increasingly evident that Australia's ability to produce these protein foods is to play a vital part in the Allied war effort.

Because of the difficulty of making additional manpower available for Agriculture, increased production of pasture products must for some time depend very largely on improving and increasing efficiency of production. For this reason we must look to pasture improvement and better management of pastures to play a most important part in our effort to provide additional primary produce. Good pastures not only produce foodstuffs of higher quality that need less manpower to process and preserve, but what is vitally important in wartime, such pastures permit a greater production per unit of manpower on the farm than do poor pastures.

Only when the limited quantities of fertilizers available are used with the maximum efficiency, the wasteful expenditure on unnecessary fertilizers eliminated, and those pasture plants of the best and most suitable type cultivated, can we hope to attain maximum results with existing facilities. It is vital that no grassland should be permitted to deteriorate through mismanagement, and production fall off in consequence.

Many of the facts fundamental to efficient grassland farming have been revealed as the result of pasture experimental work already carried out in this State, but there is still an urgent need for more research work. The experimental work carried out under the Victorian Pasture Improvement League scheme has already made a very large and valuable contribution to the fund of accurate knowledge now available to the man on the land who desires information about pastures, and it is hoped that sufficient men and money will become available to permit this scheme to be not only maintained, but expanded.

During the twelve years that the scheme has been in operation, the Department of Agriculture has carried out trials for the League at 77 centres, in addition to the experiments conducted on its own behalf. At the present time there are 49 of these Pasture Improvement League plots in existence in various parts of the State.

Some members of the Victorian Pasture Improvement League discussing the pasture top-dressing test plots at Penshurst

Seasonal Conditions During 1943

In most parts of Victoria, autumn rains came too late for satisfactory pasture growth before the cold weather set in, and consequently autumn growth was poor, and during the winter feed was particularly scarce. Gippsland experienced one of the worst winters on record.

Fortunately, the rainfall during the spring came at an appropriate time to promote a strong growth of pasture in the southern part of the State, the North-East and parts of the Gippsland district, and there was an abundance of herbage available for conservation at the end of the season.

Although handicapped by an acute shortage of manpower, farmers through co-operative effort, were able to take advantage of exceptionally good haymaking conditions and harvest probably 30 per cent. more hay than usual.

At the end of the season the surplus herbage dried off very thoroughly and unfortunately, with the advent of scorching north winds, extensive grass fires occurred in many places, causing heavy losses of stock and property.

It is unfortunate that bounteous spring growth should develop into such a dangerous fire hazard, and it is hoped that ways and means will be devised to prevent any repetition of the serious fires which occurred at the end of 1943 season.

Results from Experimental Plot

Although there has been a considerable variation in the results obtained from experimental trials from place to place, all findings indicate the supreme importance of soil fertility in pasture improvement.

While the sowing of suitable pasture species is necessarily an essential part of the general improvement scheme, unless associated with a programme of soil fertility impovement, it does not make any great contribution.

Soil Fertility.

Of the various factors important in soil fertility, an adequate supply of several mineral plant foods is essential, and a deficiency of any one of these minerals is quite sufficient to restrict growth.

Generally speaking, Victorian pasture soils are not likely to be deficient in other than phosphorus, potassium, calcium or nitrogen, and in most places phosphorus is the only one that is in short supply. These elements of plant food are not interchangeable however, and an abundance of one will not compensate for a deficiency of another. Calcium for example, is not a substitute for potassium, or for phosphorus, nor is phosphorus a substitute for potassium or for nitrogen, and so on.

Animal manure is an excellent material to use for providing plant mineral food, and so building up soil fertility, and has an added value because it also provides organic matter to form humus.

Unfortunately, only limited quantities of animal manure are available, and so it becomes necessary to use artificial fertilizers to supplement soil deficiencies in mineral plant foods.

Phosphorus (Phosphatic fertilizers).

Victorian soils are almost all deficient in phosphorus. Trials carried out with superphosphate, basic superphosphate, serpentine superphosphate and ground rock phosphate, have shown "super." to be superior for pasture top dressing, and in consequence the general recommendation for Victorian farmers is to use ordinary superphosphate in preference to any other form of phosphatic fertilizer.

The liberal use of "super." pays good dividends and without it pasture improvement cannot be undertaken with any prospect of success.

In normal times one could recommend using up to 2 cwt./ac. on non-irrigated pastures, and 4 cwt. to 6 cwt./ac. under irrigation, but at present with only limited amounts available, best use of it can be made if spread over the whole of the area to be top-dressed, and applied in the early autumn to promote growth for the winter when it is most vitally needed.

Partially cleared country at Timboon where light soils readily become deficient in potash if mismanaged.

Potassium (Potash fertilizers).

The need for using potash on pastures in Victoria is a relatively new discovery, and prior to 1932 when the Pasture Improvement League experimental trials were laid down, it was thought to be unnecessary.

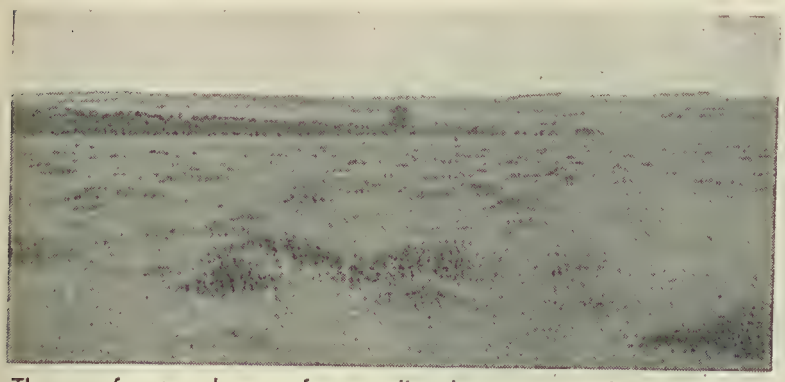
Evidence is gradually accumulating which suggests that there is a fairly extensive area of country in southern Victoria where a potash deficiency in the soil prevails, and where potassic fertilizer will probably have to be used in conjunction with superphosphate.

Ordinarily it is the light country in the better rainfall areas where a soil deficiency in potash occurs, but with bad management better soils can also become deficient in potash. Farmers should be careful therefore to avoid subjecting land to continual exhaustive treatment, such as for example, repeated cutting for hay or silage and removing the produce elsewhere. Wherever possible, fertility should be returned to the land by feeding back produce or collecting and returning farmyard manure.

A pasture growing in a soil deficient in potash, gives a very poor response to "super.," and hence the "super." applied in such circumstances cannot be used efficiently. In many cases the first obvious indication of a potash deficiency to the farmer is the failure to obtain a satisfactory response to superphosphate. This phenomenon is often misinterpreted and thought to be due to such things as "'super.' sickness," "poor quality of 'super.,'" "seasonal effects" and so on, whereas in reality the plants are getting all the phosphate they require but cannot develop because they have insufficient potassium.

As the shortage of potash in the soil becomes more and more acute, so the response to "super." becomes progressively poorer and the amounts that can be economically used become correspondingly less. On the other hand, the making good of the potash deficiency by using potassic fertilizer, farmyard manure, &c., reverses the position, and increasing applications of "super." give better and better results and more can be used with profit. On land that is deficient in potash, potassic and phosphatic fertilizers are complementary to fertility and should not be regarded as alternatives.

At the present time potassic fertilizers are very scarce and costly and therefore it becomes most important to prevent any deficiencies developing, both for the sake of pasture and to maintain the production of foodstuffs.



The use of pasture harrows for spreading dung prevents the development of rank, unpalatable growth.

An improved pasture at Woodend in the Central District.

Calcium (Lime).

On certain soils, notably the red volcanic soils of Gippsland and those derived from silurian formations at Kilmore, marked benefits accrue when lime is used in addition to "super."; in fact it is necessary to use lime in these places to obtain the best results from the "super." applied. Lime used without "super." gives a very poor response not at all comparable with "super." used alone, and it goes without saying that the use of both lime and "super." gives the best results on these soils.

The area of country in Victoria however, that gives a good response to applications of lime, over and above that obtainable from "super." alone, is by no means as extensive as some people imagine, and farmers are advised to experiment on small areas before buying large quantities of this material for top-dressing.

On soils known to respond well to lime, an appropriate dressing to use would be 6 to 8 cwt. of agricultural lime per acre every five years, in addition to the annual application of superphosphate. If burnt lime is available on the farm at a cheaper rate per unit of Ca.O then it could be used at half the rate at which one would apply the carbonate of lime.

In quite a number of places small responses to lime have been observed, but not enough to warrant a recommendation that lime be used, for generally in such circumstances more payable results would follow by spending the money on superphosphate.

An accumulation of dung in night paddocks.

As has already been stated, lime is not a substitute for "super.," but on country that gives a good response to lime, it is most desirable that it be used in conjunction with the limited quantity of "super." available to get maximum results from top-dressing.

Nitrogen (Nitrogenous fertilizer).

Pasture plants need abundant supplies of nitrogen for satisfactory growth and development, and in a mixed pasture this is made available by the clover

which collects it from the air at no cost to the farmer. This is one reason why clover is such an important constituent of a pasture. Without clover, pasture improvement is impracticable, for introduced grasses alone are unproductive and fail to persist in competition with native species. Numerous experiments have shown that it is uneconomic to use artificial nitrogenous fertilizers on pastures, and in addition, the continued application of these fertilizers has a bad effect.

The sowing of pasture seed on ash after a burn is a satisfactory method of establishing pasture in the Heytesbury forest country.

Conservation of Fertility.

Because of the importance of soil fertility to agriculture generally, every farmer should endeavour to minimise losses of fertility from the land.

Regular cropping and disposal of the produce is a sure method of depleting fertility, and no farmer should be proud of the fact that a certain paddock has been successively cropped or mown for hay for many years. A ton of meadow hay, for example, may contain the equivalent of 45 lb. of muriate of potash and 95 lb. of superphosphate, in addition to other mineral matter, and this is all lost from the soil if the hay is taken away and consumed elsewhere. When eaten, 90 per cent. of its mineral content would be excreted in the dung and urine, and if this occurs in the paddock where it was collected, or if the farmyard manure is returned, the net result is similar to ordinary grazing, and the drain on soil mineral is comparatively light. The spreading of dung by means of pasture harrowing is a means of utilizing this material to the fullest extent, but does not compensate for fertility taken away from the paddock.

Animals regularly herded, such as milking cows, deposit a certain amount of their excreta away from the grazing paddocks and consequently the loss of mineral matter is correspondingly greater. Even so, there is generally sufficient mineral available from the soil and from top-dressing to make good this loss, and soil fertility need not decline as a result.

Animal excreta left at the milking shed is a valuable commodity however, and it is a sound practice to instal a manure pit for collecting it and to subsequently spread it on the pasture as liquid manure. This not only lessens the risk of soil exhaustion but reduces the amount of artificial fertilizer needed for top-dressing.

Pasture Species.

When sowing down pastures it is very necessary to choose pasture plants that will produce the maximum amount of herbage under the prevailing conditions. Seed mixtures need not be hard and fast however, and can be varied to suit individual requirements, but it is important to establish only plants of good strain.

The appearance of seed gives little or no guide to the character of the plant it will produce. Some plants, for example, are not very leafy and therefore poor grazing plants, while others are short-lived and unsuitable for a permanent pasture, but the seeds appear quite similar to those of the better types of plant. For this reason it is desirable to buy certified seed whenever available, as this is of a guaranteed type.

In sowing a mixture, usually two grasses and two clovers of the right type are quite sufficient to produce a good mixed pasture and generally it is not necessary to sow more than 5 lb./ac. of any of the grasses or more than 3 lb./ac. of clover seed. Small seeded species such as White Clover, Lotus major and the like, can be well established from sowing ½lb. seed per acre.

To obtain the maximum grazing value from pasture plants they must of course be

A typical scene in the grey hill country of Gippsland where vigorous pasture develops after liberal top-dressing with superphosphate.

adequately nourished by the use of the appropriate fertilizer top-dressing. If not top-dressed, many of the introduced pasture plants disappear and are replaced by low-grade volunteer weed species.

Fodder Conservation.

No matter what pasture plants are sown, it is impossible under Victorian conditions to obtain a uniform growth of herbage throughout the year, so that to ensure a regular supply of feed it is necessary to conserve the spring surplus and/or grow special fodder crops. Whether the surplus pasture growth is conserved as hay or silage depends largely on circumstances. There does not appear to be a great amount of difference in the costs involved in conserving fodder in the form of hay or silage, when it is considered that a ton of hay is the equivalent in fodder value of 4 tons of silage. The advantage of making silage lies in the fact that it can be made during weather unsuitable for the haymaking, is practically indestructible and is succulent. On the other hand, baled meadow-hay is a particularly convenient type of fodder to store and to feed out to stock.

Whichever form of fodder is conserved however, it is essential to avoid repeated harvesting of the one area, and it is better to concentrate on quality rather than quantity. This involves cutting when the herbage is leafy and nutritious and easily digestible, rather than when it become fibrous and is past its prime. Fodder is a valuable commodity and from an economic point of view should be protected as much as possible from deterioration.

PASTURE IMPROVEMENT IN GIPPSLAND

Generally speaking, pasture improvement in Gippsland is easier than in other parts of the State for the rainfall is heavier and more reliable, while the soils taken as a whole are good.

Grey Hill country (Jurassic formation).

On the grey hill country which occupies an extensive part of Gippsland, cocksfoot, perennial rye grass, subterranean clover and white clover grow well in combination, and produce a good pasture with a long season of growth. Lotus major, strawberry clover and "paspalum" grow well in gullies and wet places.

Sowing of seed on the ash after a burn is a good method of establishing pasture, or where the land is being cultivated the pasture seed can be sown with the crop or in the stubble afterwards. In inaccessible places seed and fertilizer could be scattered by hand with satisfactory results. Generally autumn or spring sowing is quite successful.

Top-dressing with superphosphate is essential in the establishment and maintenance of good pastures in Gippsland, and any relaxation in this direction will result, not only in the disappearance of the sown pasture species, but the intrusion of such weeds as ragwort, bracken and bidgee widgee.

On slopes too steep for a manure spreader to function a form of knapsack spreader could be used and areas that cannot be top-dressed are best left alone.

Experiments carried out on grey soil country (blue gum) at Korumburra showed a small response to lime, but not sufficient to warrant a general recommendation that it be used on all grey hill country.

There is no doubt whatever that superphosphate gives good results on this class of country, and it can be profitably used at a rate of up to 2 bags per acre.

None of the other fertilizers appear to be necessary on grey hill country except that potash might be needed before a good pasture could be established on land that has been subjected to exhaustive cropping. In general, however, the grey soils will withstand a fair amount of cropping before they become seriously exhausted.

Red Hill country (Older basaltic formation).

The red soils of Gippsland such as one finds at Warragul, Mirboo North, Boolara, &c., are quite different in character to the grey soils and although there are several different kinds of red soils, they are essentially similar insofar as pasture improvement is concerned. Red soils dry out more readily than grey, and in consequence the pastures they carry mature sooner and are less productive during the late spring and summer than on the grey country. On the other hand, they produce earlier feed during the spring and are generally easier to cultivate.

In general the same pasture species can be recommended for the red hill country as for the grey soils, and in addition lucerne and red clover (cow grass) can be grown very well. The red soils are usually better suited to cocksfoot than they are to perennial rye grass as they are rather loose and tend to become very dry during the summer.

AVERAGE ANNUAL YIELD OF GREEN PASTURE CLIPPINGS IN CWT./AC.

Place.	Yields from experimental plots treated with—	
	Super 2 cwt. per acre annually.	Super. 2 cwt per acre per annum plus Lime 1 ton per acre (one dressing).
Red Soils—		
Mirboo North (Barrand)	60	85
Mirboo North (Austin) ..	101	125
Warragul North (Tyssen)	129	138
Limonite (Bickerton) ..	150	207
Mardan (Edney) ..	161	196
Grey Soil—		
Korumburra	205	214

Red hill country at Mirboo North, where pasture experimental plots were established in 1932.

There is a considerable variation in the productivity of pastures on red and grey soils, but in general the good grey country produces more pasture herbage during the twelve months, as will be seen by the following figures.

In contrast to the grey country the application of lime to red soil gives reasonably good results, and can be generally recommended as a supplement to superphosphate.

It will be obvious that better results from using superphosphate on red hill country will follow if the land is limed regularly and that it would be more profitable to apply both the lime and "super." than either alone.

Best results will follow if lime and "super." are applied separately although if it is not practicable to do this, no great disadvantage would result from putting them on together.

These red soils of Gippsland have the characteristic of locking up fairly rapidly and rendering rather unavailable soluble phosphate in the superphosphate applied. The practical significance of this is that a relatively large amount of the "super." applied is sometimes made unavailable by reaction with the soil before the plant can use it. The addition of lime has a counteracting effect and this can explain why its application gives beneficial results.

Claims have been made that other forms of phosphatic fertilizer would be less subject to this fixation effect and two that have been suggested for use instead of "super." are "basic super." and serpentine superphosphate. Each of these is made by diluting "super." to the extent of about 25 per cent. with another substance. In the first case it is lime that is added and in the second a material known as serpentine (Magnesium silicate). The effect of mixing these materials with "super." makes the active parts of the "super.," i.e., the phosphoric acid, less soluble in water and also it is claimed less liable to rapid fixation by the soil.

In 1942 and 1943 trials were established on red soils at Ellinbank, a few miles south of Warragul and at Leongatha with the object of finding whether these other forms of phosphate were any better than or as good as "super." Results to date have not substantiated the claims made for them.

At Ellinbank the productivity of the pasture was measured by mowing at regular intervals and weighing the clippings and the results to date are shown in the table hereunder.

Treatment.	Yields in Dry Matter (cwt. per acre).								
	15.10.42.	18.11.42.	9.12.42.	10.3.43.	18.5.43.	23.8.43.	4.10.43.	1.11.43.	Total.
Nil	10·9	11·0	2·3	1·7	1·3	1·2	5·6	5·1	39·1
Super. ½ cwt. per acre annually	12·9	11·7	2·8	1·7	1·6	1·7	8·1	5·8	46·3
Serpentine super. ½ cwt. per acre annually	10·8	11·8	2·7	1·8	1·5	1·3	7·1	6·0	43·0
Basic super. ½ cwt. per acre annually	11·4	11·2	2·7	1·8	1·6	1·3	7·1	5·8	42·9
Super. 1 cwt per acre every 2nd year	12·0	11·7	2·8	1·8	1·5	1·3	6·9	5·8	43·8
Serp. super. 1 cwt per acre every 2nd year	12·5	12·0	3·1	1·8	1·6	1·2	5·8	5·6	43·6
Super. 2 cwt. per acre every 2nd year	11·8	11·9	2·9	1·8	1·5	1·5	7·8	6·1	45·3
Serp. super. 2 cwt per acre every 2nd year	12·9	12·4	2·7	1·7	1·6	1·6	7·6	6·2	46·7
Super. 1 cwt. per acre annually	15·9	12·8	3·2	1·7	1·7	2·2	9·8	6·4	53·7
Serp. super. 1 cwt. per acre annually	11·2	11·3	2·6	1·8	1·2	1·5	7·8	6·2	43·6
Basic super. 1 cwt. per acre annually	11·5	12·2	2·7	1·7	1·4	1·4	7·5	6·0	44·4
Serp. super. 1 cwt. per acre annually, plus Lime 1 ton per acre	13·3	13·0	2·9	1·8	1·8	3·4	11·4	5·8	53·4
Super. 1 cwt. per acre annually, plus Lime 1 ton per acre	15·6	13·2	3·0	1·8	2·0	4·2	12·7	6·5	59·0
Super. 1 cwt. per acre annually, plus Lime 1 ton per acre, plus Amm. Sulph. 1 cwt. per acre annually	12·6	13·0	2·6	1·7	1·5	4·3	11·0	5·4	52·1
Super. 2 cwt. per acre annually	14·7	13·3	3·2	1·7	1·5	2·7	11·8	6·3	55·2
Serp. super, 2 cwt. per acre annually	12·5	11·9	2·8	1·7	1·6	2·2	9·2	6·5	48·4
Basic super. 2 cwt. per acre annually	13·7	13·2	3·0	1·7	1·8	2·7	10·6	6·9	53·6

Super. 75 lb. per acre = 112 lb. serpentine super., or basic super. Estimated yield 50 cwt. per acre.

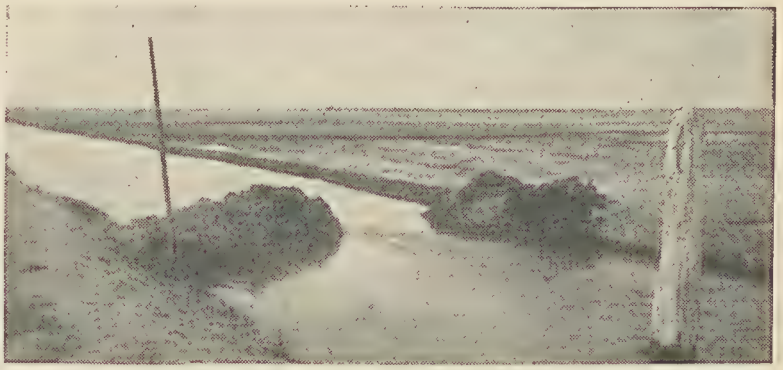
[Continued on page 274.

PYRAMID HILL COMPETITION

The Efficient Use *and* Control of Irrigation Water

Report by J. A. AIRD, B.Agr.Sc., B.Sc., State Rivers and Water Supply Commission.

EFFICIENCY in the use of water is as essential to the success of the irrigation farmer as efficiency in other sections of his work. Yet, while on the majority of irrigation farms one finds reasonably efficient methods of cultivation, farm buildings in at least useable order, and good stock well cared for, it is the exception to find a farm where the channels are clean, where there are sufficient structures in the channels, and where care in irrigation is considered as important as care in cultivation or in stock management. The consequence is that the work of irrigation is more laborious than it should be. In addition, full use is not made of the water available, and considerable quantities are lost by seepage and evaporation from poor channels, and by discharge into the drainage systems. Distribution of water is uneven, and evidences of overwatering are apparent in the development of rushes and water-logged areas. Inefficient methods of irrigation in some districts lead to an accumulation of salt on the surface and consequent sterility of the land.



The mudbank is not favoured as a method of water control in channels. It causes loss of time, labour and earth, and gives poor control of water.

The Pyramid Hill Agricultural Society therefore is to be congratulated on its decision to conduct an annual competition among district irrigators for the purpose of revealing the farm with the most efficient use and control of water.

Pyramid Hill, situated on the Pyramid Creek, an anabranch of the Loddon River, is the centre of the Tragowel Plains Irrigation and Water Supply District. This district has an area of 218,445 acres, of which 148,688 acres are classified as commanded and not unsuitable for irrigation. Irrigation in this district commenced soon after the construction of the Laanecoorie Wier in 1890 when the Tragowel Plains Irrigation and Water Supply Trust was formed. Channels were constructed but owing to the intermittent flow of the Loddon River irrigation was limited. By the *Water Act* 1905 the Trust was abolished and the area formed into an irrigation district. Water supplies were still limited and the areas irrigated were chiefly under cereals and native grass which could be irrigated in the spring when water was available. In 1912, however, the Waranga Western Channel was extended to the Serpentine Creek and provided a regular supply of water to the district.

Sufficient water, however, was assigned to the district to enable the allotment of a water-right of only one acre-foot per five acres of irrigable land. The consequence was that development was on the extensive rather than

the intensive system, and there was still a tendency to use the larger but limited supplies of water over a large area of native grass rather than to concentrate the water on a smaller area for higher quality production. During the past ten years, however, the general appreciation of the value of topdressing with superphosphate and of the utility of improved annual pastures of subterranean clover and Wimmera rye grass has led to the grading and sowing of increasing areas, with the result that the area of sown improved pastures has increased from 3,215 acres to 14,851 acres during the past twelve years.

The soils in the district are of alluvial origin, the whole area being portion of the flood plain of the Loddon River and its distributaries. These soils are described in a pamphlet entitled *A Soil Survey of Part of the Kerang Irrigation District,* the Kerang District being on the northern side of the Tragowel Plains District.

The method of judging the competition was left to the judges, who adopted the scale of points used in a similar competition in the Maffra Irrigation Water Supply District, viz:—

Layout of land for irrigation ..	25	points
Channel structures	15	„
Cleanliness of channels ..	15	„
Drainage—provision for and cleanliness of drains ..	25	„
Provision for watering of stock	10	„
Records of waterings and water used	10	„

Top—A box-type outlet with a sill to prevent washing. Lower—The outlet in position.

Layout for irrigation covered such matters as the design of the distribution system, the type of suitability of the channels for distributing water and the preparation of the land for grading, including quality of grading and method used for controlling water on the land.

The other two items on the irrigation side, channel structures and cleanliness of channels, explain themselves.

Speaking generally, farmers in the Tragowel Plains district do not suffer from the "small channel complex," the channels in most cases being large enough to carry the streams of water delivered. The methods of control in the channel are poor, however, and the mud-bank upon which "a surgical operation" is performed at each irrigation is the commonest form of control. In a few cases there were some checks of wood and/or concrete in the channels, but even so they were of poor construction and not adequately maintained.

On only one property, that of Mr. J. H. Hercus, were outlets from the channel to the land provided. The outlets were of the box type with a sill to prevent washing, and this competitor stated that he was so satisfied with them that he intended to continue making them until he had one fitted to every "bay" in his property.

Mr. R. S. Spowart, an entrant in the Summer Fodder Competition which was judged at the same time, had designed a simpler outlet which was quite effective. Mr. Spowart had made 60 of these outlets and proposed to make more. As this type is made in two pieces of which the distance apart may be varied, it can also be used as a "check" in small channels.

Weeds in channels are always a difficult problem for both the irrigator and the State Rivers and Water Supply Commission. This problem is accentuated when the irrigator uses the channel as a storage for stock water as well. The shallow water makes an ideal home for cumbungi and other water-loving plants. The first step in weed control therefore is to have facilities for watering stock in each paddock and to have some system whereby water may be drained from the channels after each irrigation. In the Pyramid district the usual method of cleaning is to dig out the bottom of the channels and the weeds with it. Although this makes a good job for a while as far as

the weeds are concerned, the additional depth in the channel holds the water and the condition is aggravated.

In districts where there are heavy winter rains or where summer rain storms are common, drainage is necessary to remove the surplus water before it affects the vegetation, lucerne being particularly susceptible. On account of the large holdings and the non-intensive irrigation, all but severe summer storms can usually be dealt with by running the water from irrigated to unirrigated land. As it is over 20 years since Pyramid had a really wet winter what might happen in such a year has been forgotten, and consequently the same provision is not made for drainage as in irrigation districts with heavier and more consistent winter rains.

The competition, which was judged at two inspections, was won by Mr. A. J. Broad, who has an area of 450 acres devoted to dairying. It will be noted from the leading scores set out below that Mr. Broad had a better layout and had cleaner channels than other competitors. Mr. Broad also had on his property a number of concrete pipes which he proposed to use to make channel structures of various types.

Second and third places were filled by Messrs. Malone and Hercus, both of whom had some channel structures which gave better control of water than in other cases.

It will be noted that no points have been given for records of water delivered and its use. Generally speaking irrigators depend on the records of the water bailiffs as to water

A type of outlet installed by Mr. R. S. Spowart. The concrete wing walls are separate and taper off from 3 inches thick to 1 inch.

delivered, but the experience of those who have kept records is that they enable a check to be made of the water used in each type of culture and so help in economy in use. One method of keeping records is described in a pamphlet *Better Irrigation,* by H. Hanslow. Copies of the pamphlet are available on application to the State Rivers and Water Supply Commission, Melbourne, C.2.

Another method is that adopted by a competitor in a similar competition at Rochester. His method is to have a plan of the farm and make a carbon copy for use each season. On this copy the dates of irrigation and quantities of water used on each paddock are shown. These records are then kept for reference and may be used to determine the quantities of water required in subsequent seasons and when to apply them.

COMPETITION FOR THE EFFICIENT USE AND CONTROL OF WATER — PYRAMID HILL DISTRICT.

List of Awards.

Name.	Layout for Irrigation.	Irrigation Structures.	Cleanliness of Irrigation Channels.	Drainage Provision.	Stock Water Supplies.	Records of Irrigations.	Total.
Possible Points	20	20	20	20	10	10	—
Broad, A. J.	15	10	15	15	8	..	63
Malone, J.	12	12	15	12	8	..	59
Hercus, J. H.	12	13	12	11	8	..	56

Irrigated Summer Fodder Crops

Pyramid Hill Competition

By R. H. BEATTIE, B.Agr.Sc.,
Assistant Agrostologist

A crop of sorghum under irrigation.

THE Pyramid Hill and District Agricultural Society continued the annual competitions for farm efficiency and summer forages this season.

The Summer Fodder Crops Section of the competition was popular in that seventeen entries were received. Crops were inspected at the end of February: eight were of Japanese millet, five of Sudan grass, two of saccaline and two of ambercane. Some remarkably good crops of all kinds were seen, many of them on crab-holey ground which is difficult to grade evenly. This type of country is well suited for the growth of the crops mentioned. However, of all the crops inspected those on the best laid out paddocks were superior.

It is a general practice in the Pyramid district to grow summer forages to provide green feed when the subterranean clover-Wimmera rye grass pastures are dry. In other irrigation districts summer forage crops are the exception rather than the rule, but they are sometimes used when the soil is being prepared for crops of a more or less permanent nature such as perennial pasture and lucerne.

Undoubtedly summer forage crops produce a large amount of nutritious fodder, but the fact that they are annuals discounts their value in relation to the more permanent crops. In the irrigation areas of Victoria the bulky, annual summer crops have given way in the majority of cases to permanent pastures and lucerne. This development was steady in the beginning, but gained impetus as time went on, until now there are few irrigation districts where annual summer forages are grown to any extent, with the exception of Pyramid Hill.

The irrigator in the Pyramid Hill district is faced with great difficulties, but the adoption and practice of good methods as a general rule undoubtedly will result in the attainment of a higher level of fertility and watering efficiency. Take lucerne as an example. It is known that for success with this crop it is essential to have a lay-out which ensures good control of water. The difficulty of grading crab-holey land is well realized, but if certain areas were tackled on a modest scale, success in achieving a good lay-out for lucerne should not be impossible.

However, the present conditions at Pyramid are well suited to the production of excellent summer fodders, and their importance is not belittled. In fact, much pride is taken throughout the district in the success obtained with these crops. They provide through the summer months an abundance of greenstuff which, with the clover hay, is a wonderful boon, especially to the dairyman.

The general practice in the district is to "sow dry" and water to bring the crop up. Only one competitor sowed into land previously watered. His land was well-graded and an excellent strike resulted, producing a good even crop. Another crop which had been sown after watering was seen, but this had not been entered in the competition. The strike in this instance also was good.

A brief discussion of the relative merits of the various types of summer fodders may not be altogether amiss. Frequently during the judging of such a competition, one is asked such a question as "Is Japanese millet better than Sudan grass, or saccaline, or ambercane?" The point is that each crop has its adherents, and the reasons given for preference in most instances are quite practical ones. All are good fodders and each has its disadvantages as well as its advantages under certain sets of conditions.

Japanese Millet

The outstanding qualities of Japanese millet are quick early growth and its ability to provide grazing under all sets of conditions at all stages of maturity with complete safety (provided grazing stock are not ravenous). The fodder is palatable to both sheep and cows until it coarsens with maturity. It is easily made into good hay, and seed may be harvested from surplus crops with the equipment available on wheat farms. Some disadvantages attributed to this fodder are its relatively poor resistance to dry conditions and the loss of palatability as it matures. Its frost resistance is poor.

A dense crop of saccaline at Tragowel.

Sudan Grass

Sudan grass bives quick early growth, has a definite resistance to dryness and drying conditions, and is easily and cheaply harvested for seed and hay. Its disadvantages are that there is some risk of stock poisoning and that palatability of the grazing deteriorates with maturity.

Ambercane and Saccaline

Ambercane and saccaline give a great bulk of feed. They are not as satisfactory for grazing as millet and Sudan grass, but can be utilized to advantage if a system of cutting, chaffing and feeding out can be practised. Ambercane matures earlier than saccaline. However, saccaline lasts longer into the winter. Of all the fodder crops these present the greatest risk of stock poisoning. But where no check has been sustained due to dryness, and if stock are in good condition, the risk of grazing on these crops in an early stage of growth is not great. The two fodder plants are unsuited to hay making and harvesting as seed production is costly and arduous.

The Awards

The winner of the competition was Mr. D. Campbell with an excellent 18 acres of Sudan grass. This crop was sown on the 15th December and "watered up." It had taken 2 feet of water and was in head at the time of inspection. 15 lb. of seed per acre was sown, together with 40 lb. of superphosphate. The previous winter crop at this site did not germinate; it had received 80 lb. of superphosphate per acre. The Sudan grass was being grown for seed production.

Mr. A. F. Smith's crop of 30 acres of Sudan grass gained second prize. It provided an object lesson on the benefits of good lay-out and management. The soil is a rather shallow red clay loam, yet an excellent crop was produced with a minimum of water. It had received two waterings to the time of inspection and it had been "sheeped" for a fortnight.

The crop was sown on Christmas day, when 20 lb. of seed was sown with 90 lb. superphosphate per acre. Mr. Smith adopts the practice of watering the ground first and then sowing deep. The irrigation runs are 17 chains long.

In a paddock adjacent to that entered in the competition Mr. Smith drew attention to the marked difference in the strikes from seed that had been obtained from two different sources. Because of the lay-out in the paddock this difference could only have been due to seed quality.

Mr. P. A. Sly's 22 acres of Japanese millet was adjudged to be a close third. The crop was very dense and ready for stripping. It was sown in November, 19 lb. seed per acre being used without manure. The land had been cropped three years ago but had not been in production since. A good yield of seed should be obtained from this crop. Mr. Sly makes a practice of using his own seed for sowing.

Following is a table showing points as allotted to each competitor:—

Competitor.	Layout.	Uniformity.	Freedom from Weeds.	Yield.	Total.
Possible Points	20	20	20	40	—
D. Campbell (Sudan grass) ..	18	18	19	40	95
F. A. Smith (Sudan grass) ..	19	18	20	35	92
P. Sly (Japanese Millet) ..	15	17	16	40	88
R. M. Jobling (Sudan grass) ..	17	14	18	34	83
G. S. Jobling (Sudan grass) ..	15	15	18	35	83
E. P. Ervin (Saccaline) ..	13	15	15	36	79
M. McKinnon (Japanese Millet) ..	15	10	14	37	76
W. Lynn (Japanese Millet) ..	13	14	13	35	75
W. Shipp, No. 1 (Japanese Millet)	13	13	16	33	75
W. Shipp, No. 2 (Japanese Millet)	13	15	16	31	75
G. Dickinson (Saccaline) ..	13	10	15	37	75
M. Findlay (Japanese Millet) ..	14	13	15	33	75
R. H. Mills (Japanese Millet) ..	13	12	16	33	74
R. S. Spowart (Ambercane) ..	15	11	15	33	74
Mrs. Johnson (Ambercane) ..	13	11	13	33	70
W. Shipp, No. 4 (Japanese Millet)	13	11	15	31	70
W. Shipp, No. 3 (Sudan grass) ..	13	11	10	30	64

Drenching of Sheep and Lambs

Before administering a drench to sheep or lambs be sure that the dose is correct for the age of the animals being drenched.

Special drenching horns which hold the correct dose may be used.

There are various drenching guns on the market, most of which are satisfactory.

To prevent injury to the membranes of the mouth when using these, it is a good idea to slip a piece of rubber tubing over the nozzle allowing it to project slightly over the point.

The sheep should be drenched standing on all four feet with the nose held about level with the eyes.

Hold the head in position with one hand with the four fingers under the lower jaw and the thumb over the nose. The jaws should not be gripped tightly. The drenching gun or horn should be passed through the side of the animal's mouth, over the tongue and between the back teeth and the dose poured or injected slowly.

The head should be lowered immediately if the sheep begins to cough.

[Contributed by the Live Stock Division.]

Common Colics of the Horse

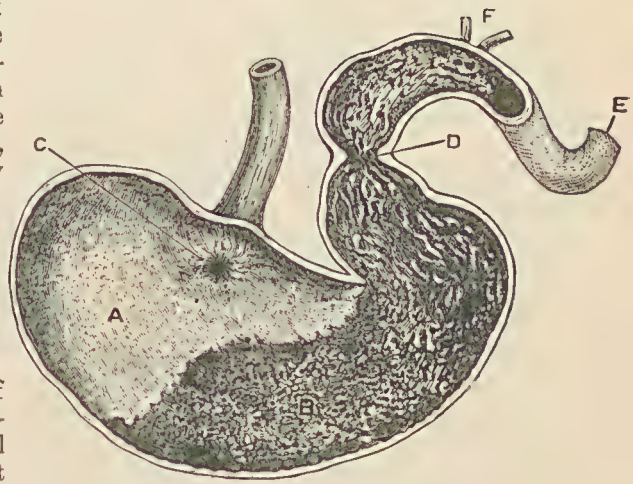
By the Veterinary Staff

COLIC is the name given to a variety of disorders in which the most noticeable symptom is a manifestation of abdominal pain, due to some form of irritation of the stomach or of a particular part of the intestines. There are many varieties of colic, the different names given to each generally having a bearing on the seat of the trouble as well as on its nature. For example, impaction of the colon or large intestine, which explains itself, is one of the most common forms of colic; gastric tympany, or excessive gas in the stomach, is another form.

A few facts about the digestive organs of the horse may be instructive as well as interesting. Relatively, the stomach is of small content, while the large intestine has a great capacity. The caecum or "water gut" also is comparatively large. There is no gall bladder in the liver for the storage of bile fluid. The combined length of the small and large intestines is almost 100 feet.

Because of the anatomical position and structure of the stomach, the horse, except in rare cases, is unable to vomit food or to eructate (bring up gas). For this reason any gases or foodstuffs present in the stomach must pass through the 100 feet length of intestine before they can be ejected. Where vomiting does occur it is almost always accompanied by rupture of the stomach and subsequent death.

The large intestine, in which the greatest number of cases of impaction both of ingesta (foodstuffs) and of sand occurs, is so arranged in the abdomen that there are three flexures or bends, and the lumen varies considerably. It is at two points particularly where the lumen of the intestine becomes smaller that impaction frequently occurs.



Stomach of a horse.

A—The left half, white and smooth. B—Right half, pink and slightly corrugated. C—Entrance to stomach. D—Exit. E—Duodenum. F—Bile duct and pancreatic opening into the duodenum.

Treatment by Veterinary Surgeon Desirable

Although there are cases of colic from which horses recover, either with the administration of one dose of medicine—usually a drench—or even without any aid whatsoever, it is desired to impress on horse-owners that at the onset of a case of colic, the severity of the pain shown is not always an indication whether the case will be a mild one, in which recovery will take place rapidly; or whether the illness will be prolonged and consequently serious.

Practically all forms of colic are relieved only when the offending material setting up the condition is passed along the bowel and finally evacuated. It should be realized, therefore, that the most desirable medicines for the treatment of colics are those whose action is quickest. These drugs, of which there are several, are used in very small doses, and are given as hypodermic injections by practising veterinary surgeons who also have many other aids for the treatment of colic sufferers that are not otherwise available to the horse-owner.

For this reason it is advised that, where available, a practising veterinarian be called in at once. If this were done most of the cases that end fatally would be saved. Even in less severe cases recovery would be more rapid than it usually is without the veterinarian's aid.

This practice of calling in a qualified veterinary surgeon early is adopted by the large carrying firms of the big cities, and they find

the action profitable, in that rapid recovery means maximum efficiency for their teams. The same practice would be profitable also with the farmer, although the expense—owing to distance—may be greater.

Causes of Common Colic

The cause of most colics is some abnormality in connexion with the food content of the digestive organs—the stomach and intestines. There may be overfeeding, flatulence due to gas formation during fermentation, or a stoppage in the intestinal canal, due to accumulations of either ingesta or sand. Bacteria, which are present in the digestive tract, also play a certain part in cases of colic.

The general exciting causes of colic have been described as "errors in the proper distribution of work, rest, watering, and feeding."

Let us take these factors in order—

Work.

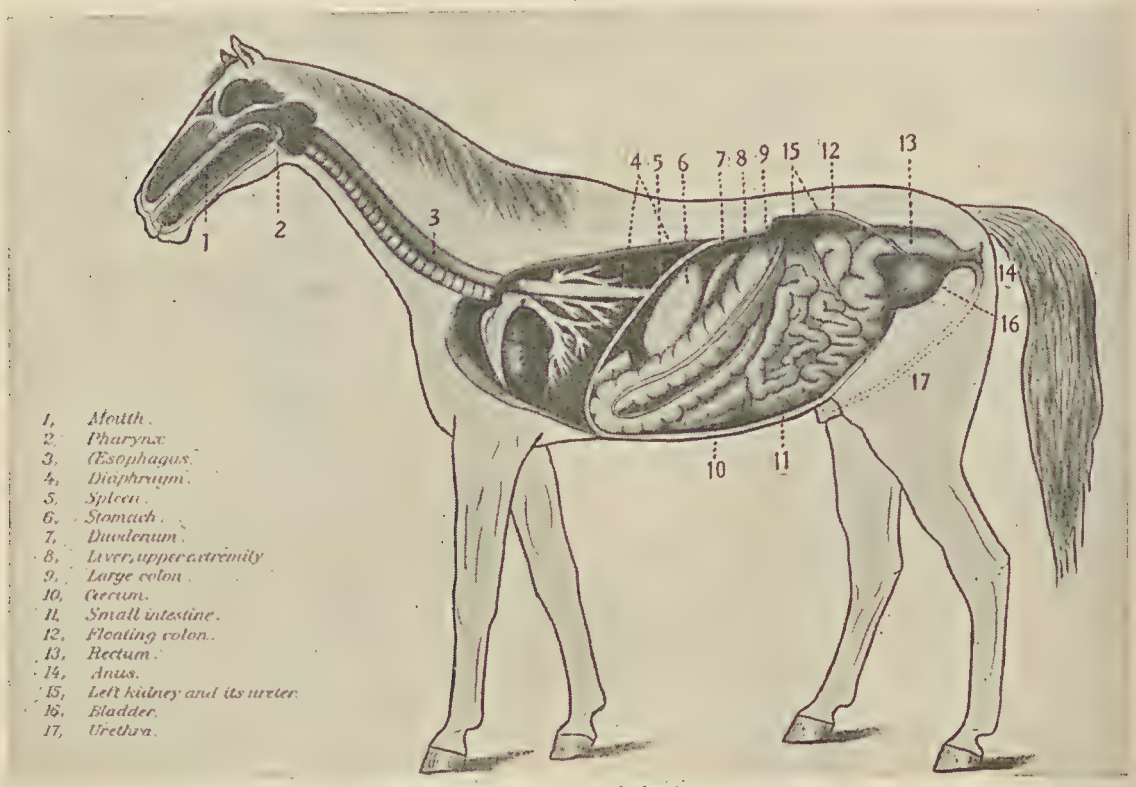
A horse should not be put into heavy work immediately after eating a large feed. If yoked up at once after feeding, he should be allowed at least half an hour before being asked to exert himself greatly. After a long exhausting period of work, he should be watered whilst hot—not when half cooled down. He should then be allowed a little time before being permitted to eat, so that his circulation and breathing may become normal. If possible, he should be given a small easily digested feed during the morning and afternoon rest periods in addition to his usual meals.

Rest.

Periods of rest such as week-ends and holidays are times when rationing of fodder should take place. These are not the times to fill the horse up in order, as is often said, to fit him for his working days. During these days of rest, often in a stable and with no exercise, light feeds should be the order; at regular times a little laxative diet, such as green stuff and bran mashes, can be given with advantage. The giving of two or three packets of Epsom salts in a small bran mash every week-end is an excellent procedure.

Watering.

It is generally considered that watering should take place before feeding, and this procedure undoubtedly is correct, especially after work.



The digestive system of the horse.

After a period of work the body is greatly depleted of fluid which must be replaced before the tone of the system can be restored; this is best done by watering the horse while he is still hot, rather than waiting until he has partially cooled down; he will then be better fitted to do justice to his feed. Watering after feeding, when the feed is taken while the horse is more or less exhausted, as is the case after work, is one of the most common causes of attacks of colic. First thing in the morning, however, especially during cold weather, a horse will not drink before eating, and provided a period of, say, half an hour elapses between the finish of feeding and watering no harm will be done.

In some stables water is provided in the stalls, and the horse drinks just when he desires; this system is quite good.

Feeding.

In his natural state the horse roams over large tracts of country, eating as he roams. He is a continuous feeder, with the result that once the stomach has become filled to a certain degree, partly digested food is passing out of the stomach into the small intestine more or less continuously. We should consider this fact when horses are being artificially fed, and the advice, "Feed small feeds frequently" is tendered.

Thus the giving of four smaller feeds is better than three large ones. The food should be of the best quality. Of all domesticated herbivorous animals horses can withstand least any defective foodstuffs. Good oaten chaff may form a maintenance ration, but for working horses an addition of oats and/or bran is necessary.

Horses should be separated for feeding. When several have to feed together, it is found that some will be prevented by fear from getting their share, and the amount they do get is often bolted; the greedy feeder also bolts his food in order that he may eat more than the others in the same time. In these cases there will be insufficient mastication, and indigestion, and perhaps colic, will result.

Teeth defects also are a cause of indigestion. Horses should be watched when they are feeding, and evidence of faulty mastication, such as the slobbering of saliva and the dropping out of food noted. In such cases the mouth should be examined and any defects of the teeth remedied by an expert.

After long and severe work it is very unwise to place a large feed before a horse. The digestive organs are not then in a state to cope with a big quantity of food. Water should be allowed, first of all, but until the animal has recovered from fatigue food should be withheld.

Changes in diet should be brought about gradually. Colic may be caused by giving hard feed solely to horses brought in from grass. By commencing with a bran mash or two, then chaff and bran in equal proportions, damped for preference, and then gradually reduced amounts of bran, horses may be brought in to an ordinary ration in a week without risk of illness.

Sand is picked up by the grazing horse in two ways:—1. On sandy country the soil is loose, and often sparsely covered with herbage. In grazing, the grass is eaten close to the ground, and sand is thus picked up with almost every mouthful. Also after rain or wind quite appreciable amounts of sand are splashed up on to the leaves of grasses and weeds, and thus taken into the digestive tract when such herbage is eaten. 2. The habit stock have of licking and eating soil, apparently endeavouring to rectify a deficiency in mineral matter, is not an uncommon manner by which sand may reach the intestines.

In the first instance, if a stock-owner turns his horses out on light sandy country when sparsely grassed he must realize the risk he takes in getting them "sanded." The second instance may be rectified by supplying mineral matter to the horses in the form of a salt and bone-meal lick.

Spasmodic Colic

Spasmodic colic is so named because of the fact that the pain shown by the affected animal is not constant, but keeps on occurring at short intervals between which the horse is free from pain symptoms.

As a matter of fact, this peculiarity need not be confined to one class of colic as diagnosed by a veterinarian; hence the name "spasmodic" in reference to colic is more a popular than a scientific term.

Cause.

Most cases in which the pain is spasmodic, however, are concerned with the small intestine and stomach, and the cause is the imperfect mastication of dry food—generally chaff—which becomes impacted in the small

intestine close to its opening into the caecum. In some cases the impacted material may be in the first portion of the small intestine, which is shaped like the letter S. In these latter cases the stomach becomes involved generally by reason of gas formation. This form of colic occurs where the horse is worked too soon after feeding, or, may be, during work in hot weather, and where dry chaff is bolted in an unmasticated form.

Symptoms.

The pain evinced is acute, and the animal shows this by throwing itself down and rolling violently, then getting up again, and perhaps remaining quiet for a short interval, after which the performance is repeated. Respiration is hurried, and often the patient breaks out into a profuse sweat.

Often the patient will attempt to pass water by stretching out. This does not indicate a stoppage of the water, and inhumane, irritant measures should not be adopted to make the horse pass urine. Get the patient over the bowel trouble, and it will have no difficulty in voiding urine.

On listening at the abdomen one often hears a tinkling sound instead of the normal movement of the healthy organs. Rectal examination by the hand helps to prove that the large intestine is not the seat of trouble as the portion that can be felt is quite soft.

Faeces (manure) may be passed in fairly normal amounts during the attack. Relief is obtained when the dry material commences to pass into the large intestine. The more severe cases of this form of colic are those in which gas formation occurs in the stomach and that part of the small intestine in front of the impaction.

Occasionally fatal cases occur, and these may be the result of a twist occurring in the intestine.

Treatment.

No. 1 Drench.

A drench may be made from—

Raw linseed oil, 1 to 1½ pints.
Oil of turpentine, 2 oz.
Aromatic spirits of ammonia, 2 oz.
Tincture nux vomica, ½ to 1 oz.

The components should be mixed together and the drench given immediately the attack commences. The mixture suggested makes an excellent first-aid drench for most kinds of colic. If such a drench be administered properly much good will be done, and its action will not be detrimental to any further treatment given by the veterinarian should one be called in. One hour after the first drench the following mixture may be given and repeated again in two hours' time:—

No. 2 Drench.

Aromatic spirits of ammonia, 2 oz.
Sweet spirits of nitre, 1 oz.
Water, ½ pint.

In all these common colics the patient should be made as comfortable as possible, and placed in a protected yard or large loose box with a soft, well-bedded floor and allowed to roll. Water should be available at all times, and the patient should be rubbed regularly with wisps of straw.

On no account should opium preparations—laudanum or chlorodyne—be used in the treatment of colic cases. Their administration may allay pain temporarily, but as they tend to stop bowel movement they are distinctly harmful.

Impaction Colic

The complaint known as impaction colic is the common form of food impaction, namely, impaction of the large colon. It is invariably due to overfeeding—often the result of injudicious feeding during week-ends and holidays.

Symptoms.

Before showing actual pain the horse may appear dull and listless; when pain appears it is of a dull type. The patient may paw with his feet, walk around his box or yard and look around at the flanks. Later, after making several ineffectual attempts, he will lie down, and, apart from looking around at his flanks and giving one or two partial rolls, may remain in the recumbent position for a considerable time.

Examination by way of the rectum will prove the diagnosis directly, as the engorged and impacted large intestine can be felt. Any manure present in the rectum will be rather dry and formed, and generally that passed out is in quite small quantities—two or three dry masses rather than a normal motion. The sounds of bowel movement are generally absent; when there is any movement it is of slight degree, and the sound, as ascertained by listening at the flanks, is abnormal.

TREATMENT.

Copious enemas, repeated every hour, should be injected. The oily drench mentioned for spasmodic colic should be given at once, and the No. 2 drench, described in the previous case, should be given every two hours.

This form of colic is one in which rapid recovery must not be expected, and it is often necessary to repeat the dose of raw linseed oil and turpentine. Some cases extend over days, but during this time constant stimulant treatment must be given. Signs of recovery can be ascertained by listening at the abdomen for sounds of movement of the intestines, and ultimately large masses of faeces will be passed. A veterinary surgeon should be called in; he will use powerful and quick-acting drugs and prescribe further treatment in the nature of bowel stimulants.

Sand Colic

Sand Colic is a form of impaction in which the impacted mass, instead of being ingesta, consists of sand. The large intestine is the portion of bowel affected, and it is invariably at the most posterior flexure or bend that the impaction takes place.

Sand may be present in the intestines of a horse for some considerable period. In such a case it is spread as a coating over the intestinal floor, in which form it may cause a certain amount of unthriftiness. Should some condition arise whereby this sand is moved along without being expelled, it may mass up at the narrow bend of the large intestine, when it will cause a serious colic.

SYMPTOMS.

The symptoms are similar to those dedescribed for Impaction Colic except that the pain shown generally is much greater, and there are early signs of inflammation, as shown by the injected eye membranes. Bowel movement is at a standstill, and rectal examination will help to confirm the impaction.

The blockage in the intestine is often so absolute that even gas cannot pass along, and in these cases the sand colic is complicated by flatulence. This is a bad sign, and may mean a fatal termination.

TREATMENT.

Should the impacted mass be of great extent (enough sand to fill a stable bucket taken from a length of about 3 feet of the large intestine) the case will almost certainly end fatally.

When the trouble does not appear severe, commence with a dose of 1 pint liquid paraffin in which is shaken up 2 oz. turpentine, 1 oz. tincture nux vomica, and 2 oz. aromatic spirits of ammonia.

This should be followed in two hours by a drench of 1 pint of strong black coffee, including the grounds, this drench being repeated at intervals. The stimulant No. 2 drench previously mentioned may be given every two hours.

Copious enemas should be given every hour, and massage or kneading of the abdomen, especially if this be done when the horse is lying in a furrow on its back, may be advantageous.

The action of some of the quick-acting hypodermic injections, as used by the veterinary surgeon when given at the outset, would pass the sand on before the impaction became acute. Whatever correct line of treatment is undertaken, the earlier it is commenced the greater is the chance of recovery.

Flatulent Colic

Flatulent Colic, another fairly common trouble, is characterized by the presence of gas in the intestine—generally the large one. Pain is evinced by the action of the horse going down and rolling. The breathing is hurried, and, generally, he has rather a panicky look.

In the first stage, little or no distention of the abdomen is apparent, but very soon the distention becomes quite evident, and is noticed more particularly in the offside flank. When distention is extreme, rolling is not freely indulged in, and if the animal lies down it does so with great care.

If besides tympany or flatulence of the intestines a similar formation of gas occurs in the stomach, the severity of the illness is greatly accentuated, and the symptoms, such as pain, breathing, &c., become more pronounced.

Unless the correct treatment be given in such a case, fatal results caused by rupture of the stomach are likely to accrue. Treatment of this condition is dealt with under the heading, "Wheat Colic."

A point for special notice in dealing with Flatulent Colic is that the symptom of flatulence invariably shows at a late stage of the progress of some colics, notably, Impaction Colic—both of ingesta and of sand—and colic due to a twist of the intestine.

In the latter case the horse will die; in the former, a speedy passage of the offending impacted mass will mean a reduction of the flatulence.

If there be inability to bring about a speedy passage of the impacted mass, it will be necessary to endeavour to control the flatulence until such time as a free passage is obtained.

TREATMENT.

The "stand-by" drench of 1-1½ pints raw linseed oil and 2 oz. of oil of turpentine can be given safely, but in case there is any tympany of the stomach it is not advisable to include aromatic spirits of ammonia or carbonate of ammonia. One teaspoonful of lysol might be added with advantage.

Copious enemas should be given frequently, while hot fomentations—given by the aid of blankets wrung out in hot water—undoubtedly help in the treatment.

Puncture of the intestine through the abdominal wall is a speedy method of reducing the tympany, but owing to the susceptibility of the horse to peritonitis this operation should be left to the discretion of the veterinarian.

Another line of treatment for flatulent colic, but one which necessitates the ability of the person treating the case to administer solid medicine in form of balls or capsules, is as follows:—Give a physic ball of correct dosage for size of horse, and at intervals of two hours administer ½-oz. doses of salicylic acid in capsules.

Wheat Engorgement

Each year at harvest time there are cases of illness in horses due to the eating of wheat in more or less large quantities. As prevention is better than cure, one might issue the warning to farmers to see that fences are in good order and that gates are kept closed.

The two main sequels to wheat engorgement are Colic and Laminitis or Founder. In all cases of wheat engorgement the horses should be taken to water immediately and allowed to drink as much as they desire; in addition, they will benefit if while drinking they are allowed to stand in water up to their knees. The foregoing statement will be questioned by many people, but it is given with the greatest confidence and can be followed unfalteringly. After this watering, they may be left standing in the water as long as is convenient, though two or three times a day they should be exercised for at least fifteen minutes.

In cases where it is known that fairly large amounts of grain have been ingested, it is advised that immediate treatment be given by drenching with bicarbonate of soda up to ½ lb. in as much water as can be poured down. Enemas, as described later, are also beneficial.

Whenever possible the services of a qualified veterinary surgeon should be obtained as it is very important that proper treatment be carried out as soon as possible so as to prevent the disease becoming chronic with its consequent deformities, such as dropped sole, &c.

Where scouring takes place colic symptoms will seldom show, but founder may eventuate. A large proportion of cases where colic develops will terminate fatally unless the right treatment is given and commenced at the earliest moment.

The chief cause of the trouble is tympany, or flatulence of the stomach, and rupture of this organ is a common sequel.

If the services of a veterinary surgeon cannot be obtained, the following drench should be given at once:—

Strong liquid ammonia, 4 drams.
Powdered sulphate of iron, 1 oz.
Water, 2 pints.

When mixed these ingredients form a precipitate, and care must be exercised to see that this precipitate or solid material is given to the animal, and not left in the bottom of the container.

In addition one capsule containing ½ oz. salicylic acid should be given every hour.

The veterinarian in treating these cases would also use a hypodermic injection of certain drugs to expel the offending wheat as quickly as possible; failing this, an aloetic ball of suitable size or a drench of raw linseed oil and turpentine should be given.

Sand in Horses

Sand colic is the most common colic in certain parts of Victoria, notably the Mallee, but if the advice given here be followed, large numbers of cases will be prevented.

It is a well-known fact that horses in districts with light or actually sandy soils pick up sand when out in the paddocks, and that this sand may remain in the intestine for a considerable time without causing a definite illness. In a great many cases the horse with sand becomes unthrifty, sluggish, dull, and listless; the coat is harsh and dry, there is a gradual falling away in condition, and death

may eventuate when the horse becomes so weak that he is unable to rise after lying down to rest. In other cases of "sanded" horses no symptoms may be apparent, but even then it is necessary to treat the horses for the removal of the sand, as sooner or later some of them, under certain conditions of work and feeding, will become affected with sand colic caused by the accumulation of the sand in one impacted mass.

In a "sanded" horse the sand lies spread out over a considerable area on the lower surface of the intestine or in small accumulations gathered in pouches; and over this sand passes the ingesta (food), ultimately to be passed as manure.

During the passage of this excreta a certain amount of sand is picked up. Sometimes there is sufficient sand in one mass of droppings to be seen at once, but in most cases it is necessary to test the manure in the following manner:—The horse is tied up in a stable and bedded down with straw; a shovelful of his manure is picked up off the straw and placed in a bucket, which is then filled with water and stirred until all the manure is broken up. This is allowed to settle, and then the fluid is poured fairly slowly over the edge of the bucket. Several additions of water are needed, and the procedure repeated until all manure has been poured out.

The sand remains in the bucket, and a dessert-spoonful from one motion is sufficient indication that an appreciable amount of sand is in the intestines.

Sometimes a "sanded" horse has a chronic diarrhoea, and in such cases the dried scour on hind legs and tail is characteristically dirty black.

After horses have been spelling on sandy country and brought into work again, it is strongly advised that they be tested for sand and where definite evidence is found, treatment should be carried out. If this be done at once, cases of sand colic will be reduced and the efficiency of the horse teams increased.

Treatment.

Prepare the horse by feeding three small bran mashes—one each at morning, midday, and evening. Early on the following morning give a drench consisting of 1 lb. honey stirred into 1 to 1½ pints of warmed fresh milk. Feed lightly on damped bran and chaff, and then follow with the undermentioned mixture—

Bicarbonate of soda	..	6 oz.
Sublimated sulphur	..	6 oz.
Bitartrate of potash	..	3 oz.
Powdered nux vomica	..	1½ oz.

Mix and divide into twelve powders. Give one powder in damped feed morning and evening for six days.

On the second day, a drench of 1 pint of liquid paraffin may be given, and towards the end of the week's treatment another milk and honey drench is recommended.

Drenching

Probably the safest method of drenching is by the use of a drenching bit, and any horse-owner will find this instrument a valuable one.

In no case should a drench be given through the nostril, and it is not necessary to elevate the horse's head too much. The tongue should not be held nor pulled out, but a little sideways movement of the tongue whilst still in the mouth may help swallowing in some cases.

If a drenching bit is not used it is inadvisable to try to elevate the head by pulling up with the halter; this only tightens and holds the lower jaw fast, and it is impossible for an animal to swallow freely under such conditions. Probably the best method is to insert a looped rope in the mouth and raise the head by this means, thus leaving the lower jaw free.

If a bottle be used to administer the drench, it is wise to wrap a piece of cloth around the neck and tie with cord.

Enemas

Probably the most effective method of giving an enema is to use a piece of rubber hosing without any nozzle and connect it to a water supply. The hose is first taken in with the hand as far as possible, then after the tap is turned on and a few gallons of water introduced, it will be found that the hose can be worked in farther for a total distance of 4 to 6 feet. Quantities of water are passed whilst this procedure is going on, but a considerable quantity is retained, and will even run forward. This method is particularly advantageous in cases of sand and impaction colics. Failing this method, a piece of hose is connected to a force pump, and several gallons of soapy water introduced.

MASTITIS TREATMENT

Present Position Outlined

By
the Veterinary Staff,
Live Stock Division.

UP to the present no single line of treatment has been evolved that will cure mastitis in cattle. This is to a large extent due to the fact that true mastitis does not represent a clinical entity. Mastitis may be caused by several different bacteria, either acting alone, or in mixed infections, and from a bacteriological point of view, no drug or chemical has yet been discovered which is effective against all the bacteria likely to produce the disease. Again, whatever the type of infecting organism, the state of the udder may vary from an early simple inflammation of the gland, the result of a recent infection, to a chronic mastitis with great destruction of secreting tissue, and the development of fibrosis. Clinically all grades are grouped together under the name of mastitis, but it is quite unsound to expect that a single form of treatment will be effective, whatever the bacterial cause and whatever the condition of the udder.

These points are mentioned to support the view that, even if an effective treatment were available, some degree of bacteriological diagnosis, combined with a clinical examination of the cow is necessary before treatment is carried out. To make available to farmers for indiscriminate use any of the chemo-therapeutic substances, which are now advocated as possessing some efficacy against mastitis, will inevitably lead to waste and disappointment.

Until recently, experiments in the treatment of mastitis in cattle have been directed mainly to the elimination of the infection by the introduction into the udder of certain special antiseptics or bacteriostatic substances. The demonstration of the efficacy of sulphanilamide against streptococcal infections of the human being, however, naturally led to its use against streptococcal mastitis in cattle. At first, the drug was administered by the mouth, and, although some investigators have reported encouraging results, the general opinion is now held that, as a universal cure for mastitis, it has proved disappointing. There is no doubt that occasional cases, from a clinical point of view, have responded fairly well to the oral administration of sulphanilamide, but even with streptococcal mastitis widely differing results have been obtained in different herds.

More recently, the topical application of sulphanilamide preparation into the udder has been advocated, and again, although with certain types of infection, and in selected cases, this has proved valuable, it cannot be considered as a universal cure for mastitis. In England some workers are now advocating the administration of sulphanilamide by the mouth, combined with the local treatment of the udder by infusion with one of the acridine drugs (such as acriflavine) or with sulphanilamide preparations but, from the point of view of the control of mastitis, the results generally are disappointing. In America other agents such as novoxil and tyrothricin are used, and as with sulphanilamide, a proportion of infected cattle responds to treatment.

The present position may be summed up, however, by stressing the following facts:—

(1) Hygiene is all important in the control of mastitis, and its spread may be limited by the adoption of a high standard of sanitation in the milking shed, and by observing some simple though important measures during the time cows are being milked. (This information is contained in a statement prepared by the Mastitis Investigation Committee for the Australian Cattle Research Association. Copies of the statement may be obtained on application to the Chief Veterinary Officer, Department of Agriculture, Melbourne, C.2.)

(2) Accurate diagnosis, both clinical and bacteriological, is essential before commencing any form of treatment.

(3) There is no cure-all for mastitis at present available.

(4) Although some cases respond to sulphanilamide therapy, its indiscriminate use would lead to a waste of a valuable drug (especially when the quantities necessary for cattle are taken into account), and lead to disappointment and eventually discredit a treatment which, in the right hands, has a definite though possibly a limited value.

Home Tanning of Skins and Hides

By A. C. T. HEWITT, M.Agr.Sc., Live Stock Science Officer

GOOD rugs and mats, greenhide and soft leather can be obtained by home tanning of skins and hides, but good quality boot, harness and belt leather can only be produced at a tannery equipped with the necessary plant and machinery.

Sheep Skins

Sheep skins should be prepared for tanning by soaking for 15 to 18 hours in water containing 4 oz. of salt to the gallon of water. The salt tends to preserve the skin and prevent the wool from pulling out. The wool of the soft skin should then be thoroughly scoured with soap and water to remove all the grease. The soap must be thoroughly rinsed out with clean water and the skin squeezed as dry as possible without wringing.

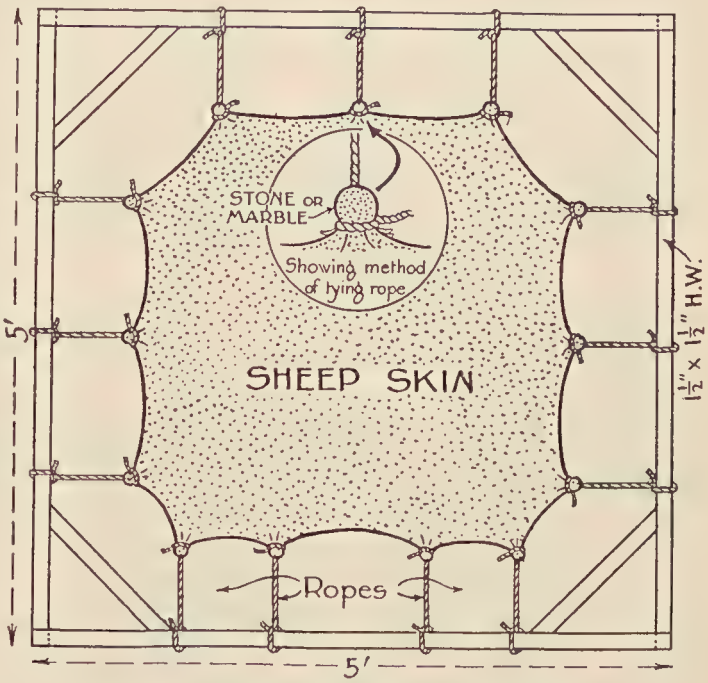


Fig. 1.—Showing method of stretching a sheep skin.

The cleaned skin should then be stretched out on a frame made from 1½ x 1½ in. hardwood, as shown in Fig. 1.

To prevent cutting the skin where the ropes are fastened on the edge, the skin may be stretched over a small stone and the rope tied round the skin, behind the stone.

The stretched skin should then be fleshed with a blunt knife to remove all meat, fat and other tissues adhering to it. An old chaff-cutter blade can be made into a good knife for fleshing skins. If necessary the flesh side of the skin should be rewashed.

The fleshed skin should be placed in a cool sheltered shed and immediately painted with a solution of 4 lb. of salt and 4 lb. of alum in 4 gallons of water, left to partly dry, and given a second coat of the tanning solution. About five coats are necessary to tan a sheep skin. The skin should not be allowed to dry out until it is tanned.

Sheep skins may also be tanned by immersing them in salt-alum solutions or in tannic acid solutions made from black wattle bark, but the wool is apt to stain when tanned with wattle bark.

Dehairing and Fleshing Hides

Fresh hides and calf skins or hides and skins cured with salt should be soaked in water for about four hours. Run this water off and cover again with clean water, and leave for about 24 hours, when the skins should be very soft.

To remove the hair, soak the skins in lime water made by adding about 30 lb. of quick or slaked lime to 100 gallons of water, for six to seven days; or less time if the hair can then be rubbed off easily. During this period the hides should be handled and moved about in the soak at least once each day. When ready, the hair can be scraped off easily with a blunt knife.

To facilitate removal of the hair, the hide should be placed over a round or half-round object, such as a log or cask, as shown in Fig. 2.

The next procedure is to turn the hide over and remove all the fat, flesh and other adhering tissues with a blunt knife. At the tannery, the fleshings are actually shaved off with a sharp fleshing knife, but much skill is required to do this without cutting the hide. When removing the fleshings the hide should be spread over a smooth log or barrel, flesh side out. The hide should then be thoroughly washed in several changes of water to remove all traces of lime, as lime interferes with the tanning process. Some weak acid, such as formic acid (formalin), lactic acid (sour whey), or boric acid should be added to one of the early washes to remove the lime.

The hide may now be made into green hide or tanned into leather.

All receptacles for soaking, washing and tanning should be made of cement or wood, and the hides or skins should always be wholly submerged.

Calf Skins

Calf skins with the hair on them may be tanned on frames in the same way as sheep skins, or they may be immersed in the tanning solutions as recommended for hides.

Calf skins need to be fleshed, scoured, and if the hair is to be removed, delimed with weak acid, and washed before tanning. Dehaired calf skins may be tacked out on a wall or table

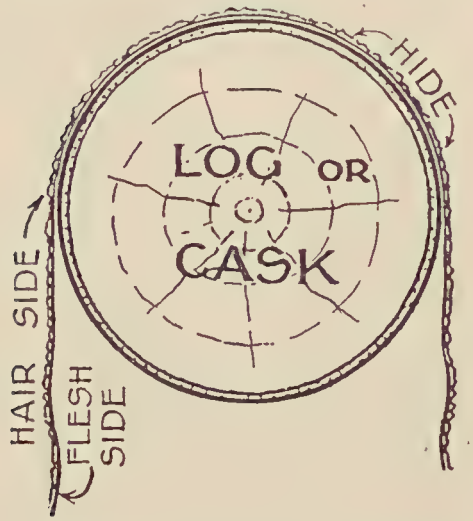


Fig. 2—The removal of hair is made easier if the hide is placed over a log or cask.

for tanning with a salt-alum solution, but beforehand they should be given a light coat of tanning solution on the grain side to prevent any decay setting in during the tanning process. The skin is then turned over, stretched, tacked out and painted several times with the salt-alum solution on the flesh side before it dries properly as for sheep skins.

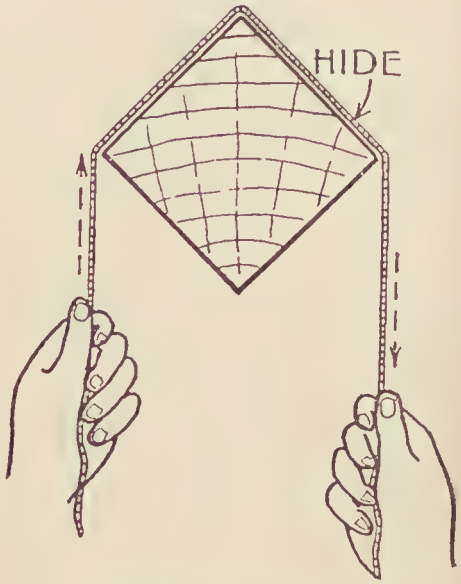


Fig. 3—Working the hide over a blunt edge to make it supple.

Greenhide

To make greenhide, the calf skins or hides should be dehaired, fleshed, delimed, and washed as for tanning. The prepared hides should then be well stretched out on a frame out of the weather in a cool shed to dry slowly. When most of the moisture has drained off, and while the hide is still soft, tallow, neatsfoot or fish oil should be rubbed into both sides of it. As the hide dries, several dressings of fat or oil should be well rubbed or worked in. The rubbing and working are also necessary to keep the hide supple. A good method of working a hide is to draw it backwards and forwards over a blunt edge on the flesh side as shown in Fig 3.

Greenhide should be kept in a dry cool place and, if found necessary, given dressings of fat or oil periodically.

Tanning

There are many methods of tanning, and for best leather the process requires fairly expensive plant, as well as skill, and can only be

done at a tannery. There are many tanning agents which may be used singly or in conjunction. For tanning odd skins on the farm, alum and salt, or black wattle bark would be the simplest tanning agents to use. With alum, a white leather or white hide is produced, whereas with wattle bark the leather is a tan colour. Oak bark, willow bark, mangrove bark, crome salts, sulphuric acid, and many other substances may be used for tanning.

In all forms of tanning the skins should not be left in the vats for more than 24 hours without lifting them, and should be lifted up for a short period to drain before re-immersing. In the early stage frequent lifts are necessary to ensure an equal distribution of the tanning material.

Wattle Bark Tanning

The skins or hides have to be soaked, fleshed, dehaired where necessary, and all the lime and grease removed before placing them in the tanning solutions. The tanning solutions are made by filling barrels with chopped or ground wattle bark. One barrel is covered with water, and after a day or so the liquid is poured off into another barrel of wattle bark, and so on until it is the colour of strong tea. Fresh water is run through the barrels of wattle bark to give weaker solutions which are first used for tanning the hides. In fact, several solutions of varying strengths may be made and the hides placed in the weaker ones first. The hides may be left for periods up to six weeks in each strength of tan during which time they should be moved and lifted to drain at least once daily. It takes from six to twelve months to properly tan a hide, although with strong solutions the hides can be tanned more quickly. A hide is tanned when the white centre disappears and the tan colour has met from both sides.

Thin skins or hides tan much more quickly than thicker ones.

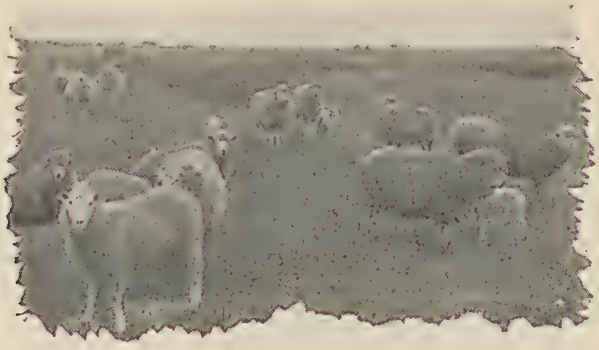
By using a mixture of wattle bark and alum the hides can be tanned in less than one month, but better leather is obtained from slower tanning.

After the hides are tanned, they should be hung out to dry slowly, and while they are drying, tallow, fish or neatsfoot oil should be rubbed into them. The hides should be worked and rubbed if a soft leather is desired.

White Hide

To make white hide, the de-haired, fleshed and delimed hides are placed in a solution of alum 4 lb., salt 4 lb. and water 4 gallons for six days, during which time they are moved, lifted and drained twice daily. The hide should be drained from the salt-alum solution, but not washed, and then stretched out to dry. When partly dry, tallow, fat, fish or neatsfoot oil should be rubbed into both sides of the hides, which should be hung up again and stretched to dry slowly. During drying the hides should be worked and rubbed to make them supple, and more oil rubbed in.

White hide may be made instead of greenhide. It has the advantage of being less subject to decay because the gelatine has been made insoluble and does not become slimy when wet, but white hide is not quite as strong as good greenhide.



War Agricultural Committee Notes

Compiled by The Central Executive

THE second harvest since the inauguration of the War Agricultural Committees has now been successfully completed. Though many new difficulties were encountered, the experience gained during the 1942-43 harvest was of great assistance in helping the Committees to overcome similar difficulties arising during the past season.

With the lessons of the previous harvest in mind, the Committees commenced their preparations many months beforehand. Wherever possible, arrangements were made to ensure the supply of essential materials to farmers, and methods of distribution were finalized. Farmers were advised to make early application for materials required so that they would not be held up when the harvest commenced. However, in spite of these early preparations, it was not possible to overcome manufacturing difficulties, and supplies of some essential materials did not come to hand in sufficient quantities at the required time.

The meadow-hay harvest was the first to receive attention. Unfavorable drought conditions early in the growing season retarded the growth of pastures, and it was difficult for farmers to place orders for baling wire as early as suggested by the Committees. As the season advanced there was every prospect of a good yield in most hay-conserving districts, and orders for baling wire increased accordingly. Consignments of baling wire arriving in this State were very irregular and caused some delays in baling. Five hundred and forty tons of wire were supplied to farmers on applications received by the Committees, compared with some 500 tons supplied during 1942-43. This is an increase of some 250 tons over the demand in previous years.

The provision of extra labour for the meadow-hay harvest in most districts was again organized on the basis of the experience in this direction gained during the previous harvest. Once again voluntary groups of townspeople from many country towns and cities played an important part in making the harvest a success. Voluntary co-operation between neighbours, which has always been a feature of meadow-hay conserving districts, was more intensively practised this year, due to the efforts of the Committees in encouraging this type of assistance.

The problems facing the Committees at this time were considerably increased by the devastating bush fires which occurred early in January of this year. A considerable amount of damage was caused which materially affected production in fairly extensive areas in this State. The relief and rehabilitation of sufferers in these areas were, therefore, of vital importance to the food-production programme. To this end, arrangements for the supply of necessary fencing materials were undertaken by the Committees. Because these materials were in very short supply, it was necessary to give priority to bush-fire victims, and the distribution of supplies as they came to hand therefore was undertaken by the Local Committees in an endeavour to see that these supplies were directed to those in greatest need of them. Special arrangements were also made with the Army for the release of stocks of materials that could be spared.

The cereal hay and grain crops were very light, and in some districts many crops were not harvested at all.

The tomato harvest, with its consequent labour difficulties, next faced the Committees. In the Goulburn Valley, where the major labour problems occurred last harvest, the lack of labour for picking the fruit was overcome by the use of Italian prisoners of war in addition to the normal labour available. These prisoners worked in gangs under direct supervision, and proved to be a very suitable type of labour for the task. During the season they picked approximately 500,000 cases of fruit, averaging about 12 cases per man per day of five hours each. This was equivalent to over one-third of the total crop harvested in the Goulburn Valley. It was largely due to the availability of this labour force that the tomato harvest in this area was such a success.

At Bendigo also the yield of the tomato crop has been very satisfactory. In this district the labour problems are not so acute as in the Goulburn Valley, and sufficient Australian pickers were available to cope with the crop. The allocation of this harvesting labour was undertaken by the District War Agricultural Committees. A large proportion of this labour force was drawn from the Pool of Rural Labour, which consists of farmers who can spare a short period each year away from their

farms helping in urgent seasonal work elsewhere. Growers of tomatoes and dried and canning fruits have expressed their appreciation of the work done by these farmers. It is gratifying to the Committees to feel that this labour force, which took much time and trouble to organize, has been of much assistance to food production.

It is interesting to note that the production of tomatoes for processing purposes this year totalled 3,400,000 cases, which exceeded that of 1942-43 by 45 per cent.

The responsibility of organizing growers to co-operate in the provision of adequate accommodation for labour directed to a district by the Man-power Directorate rests with the War Agricultural Committees. Accordingly, steps were taken early in the year to advise growers of the standard of accommodation required, and information was provided as to where suitable huts were to be obtained. Building materials were made available through local retailers to those growers who preferred to build their own huts. Despite the many difficulties which farmers face in providing suitable accommodation at the present time, the standard of facilities available in both the canning and dried fruit-growing district of this State has shown a marked improvement on facilities available previously. It is felt that this improvement should have a marked effect in improving the class of labour available for harvesting fruit crops after the war.

In the Goulburn Valley a very good fruit-crop was obtained, and in spite of some labour problems it was harvested successfully. At Shepparton the allocation of the labour was undertaken by the Fruit Growers' Association, but elsewhere the Committees carried out this task. Fruit pickers in the Goulburn Valley this year included 300 volunteers from the city and larger towns, 400 farmers from the Pool of Rural Labour, 400 18-19-year-old soldiers, and 330 schoolboys. The central camp system, which was in operation in this district during the last harvest, was used again by the schoolboys and Army personnel, who were under their own discipline and administration, all other pickers being accommodated on the individual orchards.

The dried vine fruits harvest in the Mildura and Swan Hill-Nyah-Woorinen districts was completed without major difficulty. Production was very satisfactory, being estimated as approximately 16 per cent. greater than that of last year. The Growers' Associations arranged the allocation of pickers in close co-operation with the District War Agricultural Committees. Pickers were accommodated on individual blocks, where the facilities provided were generally of a high standard. Two thousand eight hundred men and women assisted in the grape picking in the Mildura district and 775 in the Swan Hill-Nyah-Woorinen district.

There has been a considerable increase in the production of vegetables in Gippsland. This increased production has added to the demands for the labour available in the district. To assist farmers in overcoming their labour difficulties, a prisoner of war hostel has been established in East Gippsland, and the labour thus made available has enabled production to be extended into areas where vegetables were not previously grown. In other parts of East Gippsland use has been made of aliens directed to this work by the Allied Works Council.

The successful gathering of this year's harvest has been due in a large measure to the co-operation between farmers, their Associations, and the Committees. It is the objective of the War Agricultural Committees to foster this co-operation, and it is to the farmers of this State that the Committees look for help.

Live Stock Notes

Compiled by
A. C. T. HEWITT, M.Agr.Sc.,
Live Stock Science Officer

Dairy Cattle

DRY cows should be given sufficient pasturage and good quality roughage to keep them in good condition in readiness for another productive lactation period. Many troubles, such as milk fever, which may occur near calving time, can be largely avoided if the dry cows and springers are well fed on ample roughage with access to a salt-lime lick in a sheltered paddock.

Mud will have re-appeared on many farms with the arrival of winter months. If drains are kept clear there will be much less water lying about to become stagnant, and certainly much less mud.

Standing yards should be concreted if possible. No farmer will ever regret concreting his cow yard. The full benefits of this improvement are seldom realized until the job has been completed. Detailed particulars for the concreting of yards, &c., can be obtained from the cement manufacturing firms.

It is well to remember that concrete must be placed on a solid foundation. All mud should be removed and a layer of cinders, stone, gravel or sand placed on the solid bedsoil before the concrete is laid.

By keeping down mud and clipping the hair from the udders of the milkers, the labour of washing the cows' udders will be greatly reduced.

When the ground is soft, the hooves of dairy cows tend to grow long. These should be cut back and trimmed immediately the cows have been dried off and before they are too heavy in calf. Dehorning also may be done at this time of the year, but a calm dry day should be selected for the operation.

Pigs

A good example of economical pig production exists on an apple and pear orchard on the Mornington Peninsula, where about 300 pigs are bred and fattened each year.

The pigs are fed on a basic diet of cereals, meatmeal and mineral supplement, all of which are purchased, but they are run in paddocks which provide some pasture, and after the fruit has been picked, they are turned into the orchard, where they remain until the following spring.

While in the orchard the pigs eat the fallen fruit and weeds. The value of this foraging was demonstrated recently when one lot of growing pigs, which had been eating 4 lb. of dry meals per head daily while running in an almost bare paddock, had an appetite for only 2 lb. of meals per head daily after being turned into an orchard block. Their consumption of purchased foods was thus halved.

Because the overall consumption of purchased foods is low, the cost of pig production on this property is relatively low, and the net cash return is very satisfactory, but another consideration is the manurial value of the purchased foods which goes direct to the pasture and orchard land.

It is in these and similar conditions that pigs make their best contribution to the agricultural economy by converting waste and cheap by-products into meat, and returning their own by-product—manure—to the land where it in turn can be cashed through crops.

[L. A. Downey, H.D.A., Pig Expert.]

Release of Shearers from the Services

Any flock owner or shearing contractor who desires to obtain the temporary services of skilled shearing personnel at present in the Forces should lodge application well in advance of the starting date of shearing, in order that adequate time may be available in which to contact Service authorities for a decision as to whether the person applied for will be available for shearing leave

Applications may be forwarded direct to the Officer-in-Charge, Shearing Workers' Register, Room 353, T. and G. Building, Collins-street, Melbourne, or lodged with the National Service Officer for the area in which the applicant resides. These applications should be made on the special seasonal leave form obtainable from the local War Agricultural Committee chairmen or the local National Service Officers.

The following particulars must accompany applications:—

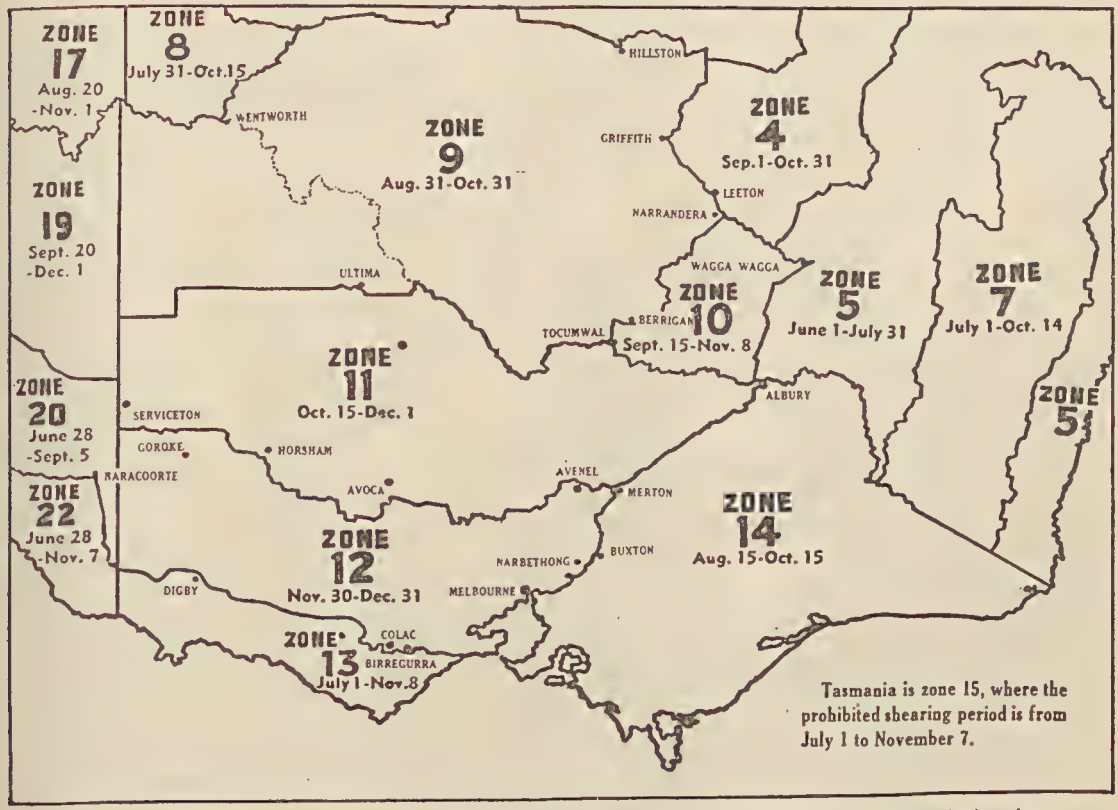
(*a*) Full military address (military number, full name, rank, unit, &c.) of the man applied for.

(*b*) Approximate starting and finishing dates of the shearing period for which his services are required.

(*c*) Approximate number of sheep to be shorn.

If more than one flock owner desires to obtain the services of the same man, a group application should be lodged.

SHEARING ZONES



The dates given above are for periods in which sheep in each particular zone may **NOT** be shorn.

Any person employing a member of the Defence Forces must carefully examine his military leave pass to ascertain that the leave granted covers the proposed period of employment. If a certificate of release or leave pass cannot be produced, the circumstances must be reported to the nearest National Service Officer.

The harbouring of any personnel for the Services, absent without leave, is a serious offence, and any one so doing is liable to very severe penalties.

Prohibited shearing periods for the respective shearing zones administered by the Victorian Man-power Directorate are as follows:—Zone 8 (July 31 to October 15); 9 (August 31 to October 31); 10 (September 15 to November 8); 11 (October 15 to December 1); 12 (November 30 to December 31); 13 (July 1 to November 8); 14 (August 15 to October 15).

Any flock-owner who is uncertain of the shearing zone in which his property is situated may obtain the necessary information from the National Service Officer for his area.

Poultry

The normal season for incubation is approaching, and eggs suitable for hatching should be selected from those gathered each day. Only normal-shaped and normal-sized eggs, with good smooth shells, and weighing at least 2 oz., should be set. The number of deformed chickens and chickens "dead in shell" will be reduced by setting carefully selected eggs.

Frequent gathering will reduce the need for cleaning the eggs. If it is necessary to use soiled eggs for hatching, they should be carefully cleaned by hand with a damp cloth, and not washed in water or in a machine. It is preferable, however, to use clean eggs direct from the nest. Eggs should always be carefully handled, and while being held for incubation they should be stored in a cool, well-ventilated room, and not subjected to sudden extremes in temperature. To prevent damage to the internal contents of the eggs and growing embryos in the incubator there should be a gradual increase in the warmth of the eggs until they reach the required temperature.

Eggs may be held for varying lengths of time and still hatch reasonably well, but there is no doubt that the fresher they are the better, and wherever possible they should not be more than seven days old when set. From the egg-production point of view, the most suitable months for hatching are July, August, and September.

The testing of eggs for internal quality by candling is advisable for best results. The term candling means the examination of the egg shell and its contents in front of a strong ray of light, the source of the light being enclosed in a dark chamber or box, and the light allowed to pass through an opening somewhat smaller than the egg. The chief points to be noted in candling are:—Size of air space, visibility and condition of yolk and condition of white, presence of foreign bodies, texture of shell, and shell defects such as cracks, &c.

The bulk of the eggs produced on the poultry farm should be uniform and of the highest standard, and this quality is more likely to be obtained if new stock is bred from fowls known to lay eggs of the right size, shape, shell thickness, and internal quality. Feeding on correct lines and keeping the birds under clean conditions are also essential.

[H. F. Clinton, Poultry Expert.]

Bees

During the cold bleak days of June and July, bees are semi-dormant, and form a compact mass within the hive to conserve warmth. During such weather it is inadvisable to open the hive, unless for feeding purposes. With the removal of the hive cover, cold air is admitted which immediately reduces the interior temperature, causing the bees to consume honey to create the necessary heat to again raise the temperature to normal. In a hive with a bare sufficiency of winter stores this may possibly cause the loss of the colony later through starvation. Should the combs be removed, chilled bees are liable to lose their hold, fall into damp grass, and fail to regain the hive.

With the exception of south-eastern Gippsland, feeding with sugar syrup has been constant this season, and some losses from starvation are occurring. With the approach of warmer weather, various native shrubs will commence to bloom and, where possible, bees that have been fed on sugar syrup should be moved to the vicinity of such bloom, because, while sugar may save the bees from starvation, the natural foods, nectar and pollen, are necessary to maintain the normal health and well-being of the colony.

The present value of honey and the assured demand for bees next spring should well repay the extra care involved in saving each colony.

It should also be borne in mind that without the protection of the bees, the combs will soon become worthless owing to the ravages of the wax moth.

[J. W. Thomlinson, Apiary Inspector.]

VETERINARY NOTES

Salt for Stock

A considerable amount of confusion seems to exist amongst stock owners with regard to the availability of salt for their stock.

Under the National Security Regulations Control of Stock Foods and Remedies Order the use of salt for sheep is prohibited except under special circumstances.

If sheep are hand-fed on cereal grain, wheat, oats, &c., salt will be made available to mix with lime, which is necessary when sheep are being fed on these grains.

Salt may also be obtained for mixing with cobalt or copper when sheep are being grazed on country deficient in these elements.

Under no circumstances other than the above-mentioned, however, will permits be issued to obtain salt for sheep.

For any of the above purposes permits to purchase salt may be obtained on application to the Chief Veterinary Inspector, Department of Agriculture, Melbourne. Applicants should state the circumstances, including the amount of salt required and the number of sheep being fed.

Permits to feed salt to cattle, horses or other animals are not required.

[W. D. Shiew, G.M.V.C., B.V.Sc., Senior Veterinary Officer.]

Tubercle-free Herds

Accredited Tubercle-free Herds.

The following herds have been declared free of tuberculosis under the *Accredited Tubercle-free Herd Scheme* conducted by the Department of Agriculture. Under this scheme a tubercle-free accredited herd of cattle is one in which the entire herd has passed two negative, successive, annual physical examinations and tuberculin tests, or upon disclosure of infection, three semi-annual, successive physical examinations and tuberculin tests applied by a State Veterinarian or by a qualified and registered veterinarian who is approved by the Chief Veterinary Inspector for that purpose.

Name.	Address.	Number in Herd.	Name.	Address.	Number in Herd.
Ballarat Orphanage	Ballarat	102	Maloney P. J.	Tongala	66
Banyule Stud Pty. Ltd.	Wangaratta	54	McNabb and Son, G. A.	Irrewillipe East	154
Black, I. S., Estate	Mount Noorat	53	Nancarrow Bros.	Kerang	52
Clarke, A. B.	Glenormiston South	15	Noonan, G.	Benalla	30
Dennis, Mrs. A. A.	Frankston	42	Noonan, Mrs. S. A.	Benalla	35
Dookie Agricultural College	Dookie	85	Northcote Children's Farm	Bacchus Marsh	164
Dunbar and Clark, Messrs.	"Hazeldean Dairy," Mount Dandenong	18	Onley, W. H.	"Glenholme," Caldermeade	64
Geelong Grammar School	Corio	78	Parker, Mrs. L. M.	Tallarook	56
Gibson, Mrs. C. S.	"Sweeney's," Eltham	35	Payne, A. E. T.	"Yarra View," Lilydale	66
Gorman, A. W.	"Cathcart," Alexandra	57	Payne, T. E. N.	"Woodburn," Kilmore	44
Griffiths, J. G.	Benalla	121	Poole, M. A. and D.	Caldermeade	151
Henry, J.A.	Warrnambool	41	Poole, M. A. and D.	Yannathan	79
Howlett, Mrs. G. and Miss E. Samuel	Lang Lang	55	Powell, T. S.	"Carellen," Mansfield	43
Jakobi, L. W.	"Granada," Yannathan	80	Richardson Bros., Messrs.	"Faldinghurst," Upper Beaconsfield	30
Kane, F. E.	Warrnambool	28	School of Horticulture	Burnley	6
Kilmany Park Farm Home for Boys	Sale	104	State Experiment Farm	Rutherglen	37
Lawrence, P. H.	"Rainga," Tarrawarra	83	State Research Farm	Werribee	245
Longerenong Agricultural College	Dooen	48	Stephens, Dr. F.	Vermont	32
			Vagg, T. E.	Officedale	45
			Wells, W. G.	Caldermeade	65

In addition to the above-mentioned herds there are 558 commercial dairy herds containing 16,553 head of cattle which may be considered free of tuberculosis. All these herds have given negative reactions to two or more successive tests conducted by departmental veterinary officers, but inasmuch as replacement cows are only submitted to one test before being admitted to the herds, they cannot be considered as accredited under the accreditation scheme which requires, among other things, that no cow shall be admitted to the herds unless it has given two (2) negative reactions at an interval of 60 days, and must be kept in isolation during the period between the two tests.

There are also 569 herds in which 12,264 head of cattle have passed one test, and may be considered, therefore, to be in process of becoming tubercle-free herds.

IN THE GARDEN

By J. L. PROVAN, B.Agr.Sc., Principal, School of Horticulture, Burnley Gardens

MANY gardeners have found it necessary to remove poplar trees. While these trees are handsome specimens in parks and large gardens, they have been found unsuitable in the small suburban garden because of their vigorous root system and a tendency for the roots to sucker as the tree ages. Their removal makes it necessary for other suitable trees for the home garden to be found, and many of the deciduous trees with a lighter type of foliage and not such a vigorous habit of growth have been chosen to replace them.

The **Silver Birch** (*Betula alba*) is popular, and prized for its naturally drooping foliage as the tree ages. The branches are rather widely spaced, and therefore the tree casts but a light shadow during the summer. In winter the sunlight reaches the soil beneath the tree almost uninterruptedly. As the tree becomes older the lower branches die, or are removed, and this enables annuals and other plants to be grown in the beds at its base.

The main purpose of planting trees in lawns and small gardens is to relieve the flatness of these places, and the value of these lightly foliaged trees is enhanced if they also possess some colour effects. The Silver Birch, with its white trunk and branches, provides a very attractive feature in the garden in winter, and, in the autumn the golden foliage is very spectacular.

The **Weeping Birch** (*Betula pendula*), which has more pendulous foliage than the Silver Birch, is another attractive tree and quite suitable for small gardens.

For those who prefer flowering trees, the **Weeping Flowering Cherry** makes a very fine specimen—Cheal's Weeping has masses of deep bright pink double flowers in the spring and attractive autumn foliage. It grows to a height of about 8 feet.

Another tree which grows to a height of about 8 to 10 feet, and which, in January, is covered with golden showers of broom-like flowers is **Genista aetnensis**, a member of the Broom family. The rush-like growths are pendulous and the small pea-like flowers make a bright picture.

Laburnum Vossii, which grows to a height of 10 to 12 ft., is a tall deciduous shrub and in early spring it bears 18-in. long trusses of yellow flowers.

An evergreen tree with small leaves and yellow to golden pea-shaped clusters of flowers is **Sophora tetraptera**, sometimes called the New Zealand Laburnum. This tree grows to a height of about 12 to 15 ft., and in spring the clusters of flowers are very attractive.

For the small garden a **Weeping Rose** makes a nice feature; it can be grown either as a pillar or as a weeping standard. Grown as a pillar, it is necessary to have a 3 in. x 3 in. jarrah or red gum post about 18 in. in the ground with suitable stays at the bottom, and requires to be about 7 to 8 ft. out of the ground. Short cross pieces of timber about 18 in. long can be nailed to the post in a symmetrical fashion, facing in both directions. This will assist the climbing and support the rose.

Paul's Scarlet Climber and *Dorothy Perkins* are suitable for use as pillar roses, while the latter also makes an attractive weeping rose.

Pruning of Shrubs

June is a good month for pruning shrubs which flower in the summer or autumn. Most spring flowering shrubs are pruned after flowering. Among the shrubs which should be pruned now are *Aralia, Aucuba, Berberis,* which should be thinned out after the berries have dropped, *Cornus capitata,* one of the Dogwoods, which carries its large strawberry-like fruit until the winter; *Crataegus, Cryptomeria japonica,* which should have any dead wood removed; *Tecoma, Buddleia, Cytisus* (Broom) *Lagerstroemia indica,* and *Leonitis leonurus.*

Ornamental vines also should be pruned in June. If the pruning is delayed too long, vines will "bleed" when cut. After cutting, say in late winter or early spring, the sap oozes out from the cuts and continues for some days. Such bleeding does not appear to be dangerous to the plant, but often gardeners become concerned about it. In pruning the ornamental vines, retain the main framework to cover the wall, or other structure on which it is climbing, and cut back lateral shoots to two

basal buds. In this way these rambling subjects can be confined to a more or less definite area in the garden.

Roses, with the exception of the *Wichuraiana* types, *Lorraine Lee* and other winter-blooming varieties, may be pruned at the end of June.

THE VEGETABLE GARDEN

Peas

English Wonder and *Melbourne Market* peas can be planted this month in rows about 18 in. apart with about 2 to 3 in. between the plants. Place the seed at least 1½ in. deep. Before sowing it is a good plan to apply superphosphate to the soil at the rate of 2 oz. to the square yard and turn it under. Do not place the superphosphate in the drill row with the seed.

Onions

Seed of *Victorian Brown, Brown Spanish* and *White Imperial Spanish* onions may be sown this month in drills in the permanent beds where they will remain. Place the drill rows about 10 in. apart and the seed should be about ½-in. deep. Cover the seed with some clean washed sand, as this will prevent a lot of work in hand weeding at this time of the year. In the home garden it is always a disadvantage to plant this seed in the permanent beds because of the amount of work entailed in weeding. Young onion seedlings do not like to be disturbed by the removal of weeds, and it is therefore usually better to transplant well-grown seedlings to the permanent bed, and this may also be undertaken this month with the varieties mentioned above. If seed is sown, as soon as the plants are large enough, thin out to 3 to 4 in. apart.

Potatoes

In frost-free localities, potatoes may be planted at the end of the month. *No. 1 Carman, Manistee* and *Katahdin* will be found suitable varieties. Space the rows at least 27 in. apart and allow about 14 in. between the plants in the rows. Put the "seed" about 4½ to 5 in. deep and do not plant "seed" which are less than 2½ oz. in weight and which do not contain at least two good eyes.

Before planting apply about 3 oz. to the square yard of a mixture of five parts of superphosphate and one of sulphate of ammonia. This should be dug in.

In frosty localities delay the planting of potatoes until mid-August.

Asparagus Beds

The top 2 in. of soil may be removed from the asparagus beds and replaced with a similar amount of enriched garden loam. Mix this loam with market garden manure at the rate of 2 oz. to the square yard.

Wet Mash Feeding

A good wet mash can be made of the following:—Bran, 30 lb.; wheat pollard or crushed wheat, 50 lb.; crushed oats or barley, 10 lb.; meat meal, 10 lb.; to which is added approximately 20 per cent. of chaffed green feed. The green feed may be fed separately if so desired.

The usual method of mixing wet mash is to mix first the bran and meat meal together, and then add the moisture. When the bran and meat meal are thoroughly moistened, add the other meals and greenstuff, and mix the whole into a crumbly mash, and not into a wet and sticky condition. If cooked meat, such as bullocks' heads, sheep's heads or livers is used in place of the meat meal, the mash is mixed with the soup, and approximately 2 oz. of the meat is fed to each bird weekly. The birds should be given as much of this mash as they will consume in about 20 minutes (approximately 2 oz. dry weight per bird each day).

Care should be taken to keep all feeding utensils and mixing troughs in a clean sanitary condition, and any mash left in the pens by the birds should be removed before it starts to ferment.

The grain should consist of wheat 80 per cent., oats or barley 20 per cent., fed in the evening at approximately 2 oz. per bird daily.

[Contributed by the Live Stock Division.]

Although at Leongatha no measurement of yield was made by mowing, it was apparent that the responses were essentially the same.

These trials have not been in progress for a sufficient length of time for final pronouncements to be made, but already they show the relatively poor results obtained from using "basic super." or "serpentine super." in comparison with ordinary "super."

It will be observed that where the land was limed at the rate of 1 ton/ac. and subsequently top-dressed with "super.," a much better yield was obtained than where "super." was used without lime. On the other hand, where the lime and "super." were mixed together beforehand, as is the case when manufacturing "basic super.," and this fertilizer is used, the yield was not as good as where "super." alone was used.

Other Soil Types (Recent Sedimentary types).

In contrast to the well-defined grey and red hill country soils there are a number of others of considerable extent. These vary from the heavy clay soils such as are found at Caldermeade, to the light sandy soils along the coastal fringe of southern Gippsland.

The alluvial soils in the river and creek valleys of Gippsland present no difficulty at all, for they are inherently very fertile and are usually well supplied with soil moisture. In this category one could include a large part of the Latrobe valley, Tarwin flats and the like, and the heavy soils on the Koo-wee-rup swamp are also similar in essential respects. Perennial rye grass, strawberry, white and subterranean clovers flourish on these soils and usually appear almost spontaneously when the land is top-dressed with superphosphate. It is advisable however to sow down after cultivation to hasten the establishment of the pasture before weeds gain a firm footing.

The lighter country such as one finds on some of the flats in the Longwarry district and the "top country" in the Morwell-Traralgon area, responds well to "super." in the initial stages and grows good rye grass and clover with liberal top-dressing, but is fairly easily exhausted of potash if subjected to unwise management. Good examples of this are evident on the experimental plots at Longwarry and Traralgon respectively, where in each instance the land on which the plot is situated was subjected to an exhaustive treatment, and subsequently two applications of superphosphate at the rate of 2 bags per acre (186 lb. per bag) have failed to give any noticeable response. Where potash was applied however, the response to "super." is normal.

On the light, sandy coastal country pasture establishment and improvement presents real difficulties.

Firstly, the depth of soil is usually not sufficient to permit deep cultivation, and in most cases it is very deficient in plant food and rather acidic in character, while defective drainage is sometimes an additional disadvantage. Trials carried out at Yanakie on very poor country known locally as the plains, and representative of an extensive area in that part of southern Gippsland, indicated that the soil responded to superphosphate in much the same way as other soils. Contrary to expectation, there was no marked response to lime within six months of application, nor was there evidence of a minor element deficiency.

In the natural state this land carried a very stunted vegetation of ti-tree, sheoak, heath and numerous other plants almost useless from the grazing point of view, and its carrying capacity is estimated as a sheep to about 4 acres.

At Yanakie after clearing, sowing down with rye grass and white clover, and top-dressing, the carrying capacity of the pasture was estimated to be at least two merino sheep per acre which indicates a vast improvement on the original condition.

The coastal country adjacent to Foster on which there is an experimental plot, is not so poor as the Yanakie country. It can be considerably improved by liberal top-dressing with "super.," but has limited reserves of potash and is readily exhausted if subjected to much cropping during the initial stages of grassing down. At the Foster plot, the pasture is suffering from a potash deficiency presumably because the land was cropped with potatoes a number of times before sowing down, and in consequence is giving little or no response to "super." unless potassic fertilizer is applied in addition. It seems that considerable care should be exercised in the clearing and sowing down of this country, and further trials are needed to indicate the most satisfactory procedure to follow.

PASTURE IMPROVEMENT IN THE WESTERN DISTRICT

Most of the Western District presents good prospects for pasture improvement work, although in the northern part the rainfall tends

to be rather light and uncertain, and some difficulties must be expected in consequence.

In general, sown pastures respond well to superphosphate, but some areas need potassic fertilizer in addition. The places where lime gives a satisfactory growth response are very few.

Broadly speaking, the Princes Highway marks the boundary of the basaltic plains country and the southern sedimentary soils, and the main area of very good pasture land lies within ten miles north or south of the highway.

Basalt Plains.

These constitute the largest and least improved part of the Western District. Soils generally are deficient in phosphorus, but with top-dressing are capable of carrying first-class pastures of subterranean clover and rye grass, provided the rainfall exceeds 20 inches per annum. Under less favourable rainfall conditions perennial rye grass is usually short-lived, when reliance must be placed on Wimmera rye grass or Phalaris tuberosa.

In their natural state these basaltic plains carry a persistent cover of native grasses such as wallaby, spear grass, etc., and the first step in pasture improvement is the introduction of new species capable of responding to improved conditions of soil fertility. On extensive areas where cultivation is impracticable, probably the best procedure is top sowing in the late autumn with a mixture of subterranean clover and superphosphate, but if the land can be brought under the plough it can be seeded down with rye grass and sub. clover under a cereal crop, sown to offset the cost of cultivation.

As with pasture improvement on all other classes of country, regular top dressing with superphosphate is an essential part of the programme, and unless this can be carried out the resulting pasture is likely to be poorer than it was at the beginning.

Because Phalaris tuberosa develops very slowly during the seeding year it is best if "combined" into the stubble rather than sown with the cereal crop, but rye grass and subterranean clover can be sown either with the crop or afterwards as desired.

One cannot prescribe an appropriate manurial treatment for the whole of the western plains because of their extent, but the quantity of "super" that could be applied annually with profit would be in the range of ½ to 1 cwt./ac.

Trials at Hamilton, Penshurst, and Mortlake show progressive improvement with the use of increasing amounts of superphosphate up to 2 cwt./ac., but no improvement from applications of lime or gypsum. The response to basic superphosphate was inferior to ordinary "super."

On light land at Mortlake (The Sisters) a response to potash was obtained, and this was also the case at Penshurst where the area on which the plot is located had been heavily cropped with cereals for some years.

This should serve as a warning that light country on the western plains is potentially short of potash and must be handled carefully in consequence. In some areas where the soils are very sandy in texture they are suited only for growing subterranean clover and carrying sheep. It would appear to be uneconomic to attempt to develop the establishment of strong mixed pastures on such soils, and probably the sowing of subterranean clover and top-dressing with ½ cwt. superphosphate every second year would represent the most appropriate treatment in such circumstances.

Stoney Rises and Black Flats.

Throughout the Western District there is, in the aggregate, a considerable area of stoney-rise country with which is usually associated heavy fertile black flats.

Both the stoney rises and the flats are inherently very fertile, and the two are complementary insofar as grazing is concerned, for the rises produce good autumn and winter feed, while the flats contribute their quota later in the season. A top-dressing trial at Stoneyford on semi-improved pasture did not show any marked improvement from top-dressing with superphosphate, but no doubt the use of "super." would considerably hasten the establishment of subterranean clover among the stones. Phalaris tuberosa and cocksfoot became strongly established on the Stoneyford plot and have continued to make vigorous growth for the last twelve years, but perennial rye grass did not persist.

The problem with introducing pasture plants in the stoney-rise country arises from the fact that implements cannot be worked among the stones, and unless the plants can be established by broadcasting seed, there seems little hope of effecting any improvement in this direction. One possible method of plant introduction would appear to be the cultivation of small areas of sown grasses and clover in suitable places, harvesting these for hay and feeding out during the autumn. Many of the

pasture seeds pass undigested through the animals and plants would become established in the dung pats.

In contrast to the difficulty of sowing better pasture species on the stoney rises, plant introduction on the black flats is relatively easy and in some cases hardly necessary. Drainage is the main problem, and even if this proves insurmountable, the sowing or planting of strawberry clover from cuttings in the spring-time, and top-dressing of as much of the area as practicable with "super." when the water recedes, will effect a considerable improvement. On some of the flats where tussock grass is firmly established, burning in the late autumn coupled with top-dressing with a mixture of superphosphate and subterranean clover will give good results.

The heavy black flats will grow perennial rye grass, although perhaps not as well as more loamy soils, but Phalaris tuberosa does particularly well under such conditions.

Deep Strong Sandy Loams.

Most of this type of country is to be found along the edge of the basaltic flow, for example at Terang, Camperdown, Colac, &c. This land is easily improved and capable of carrying excellent mixed pasture.

Perennial rye grass, subterranean clover and paspalum or cocksfoot are worth sowing in this type of country and grow vigorously for nine months of the year with paspalum and cocksfoot contributing some green feed during the summer and early autumn. Establishment of these species is easily achieved by sowing with a cereal crop or on the stubble afterwards. In many places rye grass and subterranean clover is already established and top-dressing only is necessary to produce a first-class pasture.

Light Soils.

An extensive area of light country occurs to the south of the main Western District highway. In an unimproved condition this land might be described as poor sheep country, but with sowing down and top-dressing it will support dairy herds.

Although enjoying a fairly liberal and reliable rainfall, this land has a low fertility and has poor reserves of potash, and in a number of places top-dressing with potassic fertilizer in addition to "super." appears to be necessary.

Experimental plots at Deans Marsh, Pirron Yallock, Cobden, and Timboon have all shown responses to potash, and indicate the wide stretch of country involved.

The pasture species most suitable for sowing in this part of the Western District are perennial rye grass, subterranean clover, white clover, and paspalum or cocksfoot. In the timbered country the sowing of seed after a burn without cultivation is the method recommended, and generally not more than one crop should be removed before sowing down to pasture. As in other parts, regular top-dressing with "super." is an essential part of the pasture improvement programme. There is no positive evidence from top-dressing trials in any part of this area of light country that lime gives a payable response, and until such time as definite results are obtained from trials, farmers are advised to proceed cautiously in this direction.

PASTURE IMPROVEMENT IN THE CENTRAL DISTRICT

In comparison with the Western and Gippsland districts, pasture improvement has been somewhat neglected in the Central District, and yet there is sufficient rainfall and the soils generally are good enough to carry much better pasture than they do at present.

Black-soil flat overlying basalt in Central District. This country should be capable of carrying a strong pasture of strawberry clover and rye grass or phalaris tuberosa instead of native tussock grass.

Volcanic Plain Country.

The greater part of the western portion of the Central District consists of fairly shallow soil overlying basalt, and the rainfall in this area is not as plentiful as one would wish, nevertheless considerable improvements are being effected by the sowing of subterranean clover with Phalaris tuberosa or with Wimmera rye and the establishment of lucerne. This later species grows particularly well on the red soil country that extends from Werribee through the Melton Rockbank area. Establishment of pasture species cannot be undertaken quite as readily on the grey basaltic plain country as on the more friable soils where cereal growing is regularly carried out.

On the deeper, more mature black soils derived from the basaltic flow such as are found in the Whittlesea, Yan Yean area, first-class pastures of perennial rye grass and subterranean clover can be readily grown, and strawberry clover and Phalaris tuberosa could be appropriately introduced into the very heavy, low-lying areas.

The sowing of any of the foregoing species cannot give satisfactory results unless accompanied by regular top-dressing with superphosphate. There is as yet no evidence of the need for using either lime or potash in conjunction with "super." on the volcanic plains country in the Central District.

Silurian Soils.

In the eastern part of the Central District an extensive area of country derived from the old silurian formation is to be found. These soils are inherently rather poor in mineral plant food, and in addition to needing superphosphate, show marked responses to lime and in places to potash.

At Kilmore and at Coldstream the response to "super." is improved by the addition of lime, particularly at the former place, where "super." gives a poor result until lime is applied.

Spectacular results have been achieved in the Lilydale district on light country by top-dressing with "super" only, and this is the first essential in pasture improvement, whether or not lime is subsequently used.

Experimental trials located at Coldstream and Yering have shown that the silurian soils can be readily exhausted of potash if subjected to mismanagement, and this phase should be carefully watched. Some of the very poor silurian country to the east of Lilydale such as one finds in the Seville, Wandin-Yallock area, does not grow a satisfactory pasture until lime and potash are used in conjunction with "super." Very good results in this area have followed the use of "cement ash" (a waste product containing lime and potash) with superphosphate. Unfortunately cement ash is no longer available.

A strong pasture of phalaris tuberosa in the Central District. This grass is recommended for places unsuitable for perennial rye grass.

Further evidence of the value of potassic fertilizer on this silurian country has been obtained from an experimental trial at Pakenham.

Red Hill Country.

In the region of the Dandenong range a fairly extensive area of deep red soil occurs, similar in many respects to the red soil further east in the Warragul-Drouin district, although it is slightly different geologically.

Cocksfoot, rye. grass, subterranean and white clovers would be suitable species to sow in this area and top-dressing with superphosphate would be essential for success. Red clover and lucerne should find these deep red soils to their liking.

An experimental plot on the property of Mr. W. J. Pearson, Benalla. The sub-clover pasture is in full flower, the unmanured strips visible because of the insufficient growth to hide flowers.

It is probable that lime could be used advantageously in addition to "super.," but no definite experimental evidence is as yet available to support a recommendation to this effect.

Mornington and Bellarine Peninsulas.

The soil on the two peninsulas are very variable, and range from the light sandy ridges, such as one finds at Cranbourne and in the country south of Geelong, to the heavy black flats along the western side of Corner Inlet. On the sandy ridges, paspalum and subterranean clover with, perhaps, Wimmera rye grass could be generally recommended while on the black soils flats perennial rye grass, subterranean clover, white clover or strawberry, &c., and "paspalum" would be a good mixture to aim at. Where "paspalum" is included in the sowing, however, it is essential to keep fertility up by regular top-dressing with superphosphate, otherwise this grass tends to dominate the sward and crowd out the rye grass. Properly controlled, "paspalum" makes a very useful contribution to the grazing during the warmer part of the year.

On the very heavy flats Phalaris tuberosa and red clover (cow grass) would be a good combination to establish, or in place of red clover, strawberry, which grows well in association with phalaris and is very persistent and nutritious.

The lighter, rising country derived from the old silurian and ordovician formations, such as is to be found in the vicinity of Mornington, is probably best sown to subterranean clover and perennial rye grass, and it responds very well to top-dressing with superphosphate.

To the east of Corner Inlet on the peaty soils of the Koo-wee-rup swamp, perennial rye grass and subterranean clover grow vigorously, and a little white clover is worth including in the mixture. On the heavier soils at Caldermeade perennial rye grass, cocksfoot, or "paspalum" with subterranean, white or strawberry clover given regular top-dressing with superphosphate, will produce pastures of the very best quality and productivity.

PASTURE IMPROVEMENT IN THE NORTH-EASTERN DISTRICT

Pasture improvement in the North-eastern district of Victoria is perhaps a little more difficult than it is south of the Dividing Range, insofar as plant introduction can be more speculative, and the extreme dryness that develops during the summer places a severe strain on perennial plants, especially during the early years of establishment. Another factor that sometimes re-acts against satisfactory pasture establishment is the level nature of the land and the tendency for poor drainage in consequence during the winter.

On the other hand temperatures are generally much more favourable for growth during the winter time than they are in the southern part of the State, and, in consequence, plants satisfactorily established during the autumn can make considerable headway during the seeding year.

In general, the soils in the North-eastern district are very responsive to "super.," and, apart from a small response to lime at Wangaratta, there appears to be no evidence for any other recommendation than to use "super." liberally.

Subterranean clover grows particularly well throughout the whole area if top-dressed regularly, and although generally the mid-season strain with perhaps some of the late Tallarook strain admixed could be recommended, as one moves west from the Hume Highway and the rainfall rapidly decreases, an early mid-season strain would be more certain to set seed and persist. On the Benalla and Wangaratta experimental plots a mid-season strain of subterranean clover occurs naturally, and no doubt is well suited to the environment. On the other hand, perennial rye grass finds conditions marginal and results to date indicate that it may need reseeding every four or five years, depending on the severity of the dryness during the summer. Further east, however, rye grass is more persistent.

Sowings of perennial rye grass made at various rates on the N.E. plots showed little or no advantage from using more than three pounds of seed per acre, and where the perennial rye grass is not expected to persist for long, one or two pounds of Wimmera rye grass might be mixed in with it to advantage.

For short rotation pastures there seems to be nothing better than Wimmera rye grass and subterranean clover, both of which are very easy to establish and grow well in association with each other.

Generally one should not attempt sowing white or strawberry clover except in well-favoured locations, such as on the lower levels of the Goulburn flats or in selected places in the King, Ovens, and Kiewa Valleys, &c. Strawberry clover is particularly suitable for establishment in swampy places, and extensive areas can develop from small beginnings when conditions are favourable.

Phalaris tuberosa is particularly well suited to North-eastern conditions, but is recommended only for places where perennial rye grass cannot be grown.

A considerable area of rising country which is too dry during the summer for perennial rye grass to hold could appropriately be sown with Phalaris tuberosa. At present many of the improved pastures in the hill country consist of excellent subterranean clover, and as the level of soil fertility builds up with regular top-dressing, annual weed grasses such as barley grass, hair grass, &c., come in. Such grasses could with advantage be replaced by phalaris, or if a more temporary grass was required, Wimmera rye grass would be suitable.

In some places in the N.E., phalaris has been established on old subterranean clover pastures by feeding out mature hay in the autumn, but generally it would be safer to depend on giving the surface some sort of cultivation in the early autumn, not necessarily deep working, but enough to give seed cover and protect the seedlings from drying out.

Lucerne is another valuable pasture plant that can be grown satisfactorily in many parts of the North-east. Places where there is a good subsoil drainage should be selected, and, once established, it can withstand plenty of dryness. For ordinary conditions four to six pounds of seed per acre should produce a good stand of lucerne. When sowing on virgin soil it would be advantageous to inoculate the seed to hasten the development of root nodules, in which case special precautions in sowing have to be taken. Liming the land about a month before sowing is considered a good practice when lucerne is to be established.

The success of any pasture improvement work that is undertaken will depend on top-dressing with superphosphate, for the soils in the North-east, as in other parts of the State, are deficient in phosphate, and the introduced plants cannot compete with native species unless fortified with added phosphate.

In the better rainfall areas one could use a bag per acre in normal times, and where the rainfall is less one would apply correspondingly lesser amounts.

Many of the flats in the river valleys of the North-east are potentially very productive if top-dressed with superphosphate, and in many places sowing down is quite unnecessary as the appropriate pasture plants are already there.

No better example of the value of top-dressing could be quoted than the Kiewa Valley, where butter-fat production has increased considerably since top-dressing became general in that area.

The conservation of surplus spring growth is a corollary to stimulation of pasture growt by top-dressing, and in this direction th North-east has given a lead to other parts of the State.

A list of plants named in the foregoing article will be found on page 288.

The remainder of this report dealing with irrigated pasture trials in the Northern District will appear in a subsequent issue of the Journal.

Standard Herd Records

For Quarter ended 31st March, 1944

In the following is set out the records of all cows which completed a lactation during the quarter. The number is 336, of which 227 qualified for the certificate. The figure in brackets after the owner's name shows the number of entries.

The amount of butter-fat required for qualification varies with the age class to which the animal belongs, the standard being as follows:—

Junior 2-year-old (under 2½ years at time of calving)	230 lb. butter-fat.
Senior 2-year-old (between 2½ and 3 years at time of calving)	250 lb. butter-fat.
Junior 3-year-old (between 3 and 3½ years at time of calving)	270 lb. butter-fat.
Senior 3-year-old (between 3½ and 4 years at time of calving)	290 lb. butter-fat.
Junior 4-year-old (between 4 and 4½ years at time of calving)	310 lb. butter-fat.
Senior 4-year-old (between 4½ and 5 years at time of calving)	330 lb. butter-fat.
Mature cow (5 years and over)	350 lb. butter-fat.

N.C.K. denotes no chart kept.

Name of Cow.	Herd Book No.	No. of Days in Test.	Milk Last Day of Test. lb.	Milk. lb.	Average Test.	Butter Fat. lb.	Standard Required.	Class.	Previous Yields of Butter Fat.	Sire.
Andrew, W., Whittlesea, Ayrshire (3).										
Kelvin Grove Rhodanthe	C.R.	273	25	8,467	4·10	347·3	250	Sr. 2		Kelvin Grove Masterpiece 2nd
Scotsburn Peace	Vol. 36	273	19	7,587	4·28	324·7	230	Jr. 2		Scotswood Gordon
Scotswood Golden Emblem 2nd	33040	273	17	8,503	5·14	437·4	350	Mature		Summerhill Digger
Atkinson, W. K., Swan Hill, Dairy Shorthorn (2).										
Willow Park Camelia 43rd	C.C.	273	19½	7,996	3·49	279·2	230	Jr. 2		Willow Park Imperial Cran 10th
Willow Park Duchess 48th	15290	273	20½	10,656	3·48	370·6	290	Sr. 3	339	Anderson Imperial Cran 6th (Imp.)
Ballarat Orphanage, Ballarat, Jersey (4).										
Cardigan Pearl	80668	273	N.C.K.	4,909	5·04	291·5	310	Jr. 4		Orphanage Quicksand's Thorn
Orphanage Bettine 2nd	68454	240	4	5,130	4·34	222·5	350	Mature	392, 337, 463, 398	Orphanage Arvey
Orphanage Melba 11th	63536	273	N.C.K.	6,207	4·48	278·1	350	Mature	313, 450, 536, 429, 403	Murona Twylair
Orphanage Molly 15th	Vol. 30	273	N.C.K.	5,125	5·67	290·6	250	Sr. 2	309	Clarendon Eyre Oxford Observer
Banyule Pty. Ltd., Wangaratta, Jersey (7).										
Banyule Hawthorn 21st	56253	273	21½	8,168	4·61	376·7	350	Mature	449, 439, 606, 423	Banyule Oxford Don
Banyule Hawthorn 23rd	75073	273	21	7,471	4·54	338·9	270	Jr. 3	306	Tavistock Honesty's Prince 2nd
Banyule Molly 62nd	60497	273	24	8,894	5·41	481·2	350	Mature	447, 551, 558	Banyule Gipsy Moth
Banyule Psyche	80159	273	12	5,717	4·93	281·8	250	Sr. 2		Heatherlea Regent (Imp.)
Banyule Silvermine 119th	60504	273	18½	7,323	5·09	372·6	350	Mature	398, 396, 423	Banyule Triplane
Banyule Silvermine 124th	65347	273	22	8,456	5·09	430·5	330	Sr. 4	523, 445	Banyule Comet
Banyule Silvermine 141st	80166	273	16	6,581	5·58	367·1	230	Jr. 2		Banyule Quoit
Barkla, R. E., and Sons, Joyce's Creek, Jersey (1).										
Green Gully Dawn	Vol. 30	273	10	4,607	5·13	236·5	290	Sr. 3	187	Orphanage Major
Bennett, J. W., Yinnar, Jersey (6).										
Ellendale Banksia 4th	Vol. 30	240 (Sold)		5,970	5·62	335·4	310	Jr. 4	399	Avalon Prince Madeira
Ellendale Cloudy 7th	76080	240 (Sold)		7,455	4·91	366·4	330	Sr. 4	415, 465	Staghorn Bellboy
Ellendale Duchess 2nd	61417	273	N.C.K.	7,926	4·37	346·3	350	Mature	433	Staghorn Bellboy
Ellendale Duchess 11th	Vol. 31	273	N.C.K.	6,630	4·72	313·1	250	Sr. 2		Ellendale Banksia 2nd's Bellboy
Ellendale Kirsty 26th	66336	273	N.C.K.	8,342	5·08	424·1	350	Mature	378, 581, 486	Staghorn Bellboy
Ellendale Kirsty 45th	Vol. 30	273	N.C.K.	9,434	4·53	427·2	270	Jr. 3		Staghorn Bellboy
Bennett, R. H., Lancefield, Jersey (3).										
Edenhope Iris	76034	273	19	7,196	5·85	421·3	330	Sr. 4	324, 328, 394	Jindivick Defience
Edenhope Northwood's Princess	71114	273	25	7,862	5·72	449·8	350	Mature	340, 380	Lancefield Madeira's Chance
Edenhope Tulip	61372	273	19	7,184	5·19	373·2	350	Mature	333, 359, 430, 417	Edenhope Canary's Count

Name of Cow.	Herd Book No.	No. of Days in Test.	Milk Last Day of Test. lb.	Milk. lb.	Average Test.	Butter Fat. lb.	Standard Required.	Class.	Previous Yields of Butter Fat.	Sire.
Black, Estate of the late I. S., Noorat, Ayrshire (2).										
Mount Noorat Mussua ..	34883	273	14	7,884	4·49	353·0	250	Sr. 2	.. ..	Sandhill Kipling (Imp.)
Mount Noorat Teshu Mai ..	35704	273	10	4,710	4·45	209·6	230	Jr. 2	.. ..	Sandhill Kipling (Imp.)
Bott, J., Yarrawonga, Red Poll (9).										
Naranghi Bottle ..	Vol. 12	273	12½	5,813	4·40	256·0	250	Sr. 2	.. ..	Bundure Monture
Naranghi Dame	Vol. 12	273	17	6,927	4·20	290·7	270	Jr. 3	.. ..	Bundure Ambition
Naranghi Donna ..	Vol. 12	273	13	5,304	3·85	204·4	250	Sr. 2	.. ..	Bundure Monture
Naranghi Eugenie ..	Vol. 12	273	24	7,137	4·49	320·3	250	Sr. 2	.. ..	Bundure Whipple
Naranghi Fair Wind ..	Vol. 12	273	19½	6,840	3·63	248·3	250	Sr. 2	.. ..	Bundure Winter
Naranghi Fancy Free ..	Vol. 12	273	25	9,585	3·87	371·1	250	Sr. 2	.. ..	Bundure Winter
Naranghi Jade	Vol. 12	273	27½	9,413	4·36	410·2	250	Sr. 2	.. ..	Bundure Waterloo
Naranghi Mushroom ..	Vol. 12	273	30½	9,423	3·73	351·6	250	Sr. 2	.. ..	Bundure Waterloo
Naranghi West Wind ..	7508AA	240	4	7,410	4·15	307·7	230	Jr. 2	.. ..	Bundure Winter
Broad, Mrs. A. A., Sutton Grange, Jersey (1).										
Grangelea Rose 8th ..	71632	273	18½	5,981	6·28	375·6	310	Jr. 4	304, 390 ..	Banyule Macon
Broad, A. J., Pyramid, Jersey (1).										
Lynlea Rose Petal 3rd ..	82555	273	14	5,089	6·28	319·6	230	Jr. 3	277 ..	Grangelea Max
Carne, W. J., Pakenham Upper, Jersey (3).										
Glencarne Bridal Song ..	Vol. 31	273	14	5,464	4·64	253·8	230	Jr. 2	.. ..	Brampton Noble Standard (Imp.)
Glencarne Starbright ..	C.R.	273	9	3,837	5·39	206·8	230	Jr. 2	.. ..	Wonga Park Ace High
Wompini Rosalie 2nd ..	38265	273	15	7,440	5·70	424·4	350	Mature	332, 412, 369, 341	Brucevale Bright Star
Chadderton, J. E., Hamilton, Jersey (6).										
Glen Leigh Dancer ..	76345	273	12½	5,040	6·07	305·7	250	Sr. 2	247 ..	Glen Leigh Volunteer
Glen Leigh Dawn 3rd ..	57357	273	12½	5,273	6·80	358·4	350	Mature	342, 344, 425, 391	Selsey Jupiter
Glen Leigh Dawn 5th ..	81446	273	13	4,347	6·31	274·3	230	Jr. 2	.. ..	Selsey Taxpayer
Glen Leigh Destiny 7th ..	81448	273	15½	6,201	5·45	338·0	230	Jr. 2	.. ..	Selsey Taxpayer
Glen Leigh Diamond ..	66575	273	10	6,445	4·30	277·2	350	Mature	279, 307, 353	Glen Leigh Volunteer
Glen Leigh Dolly 3rd ..	52824	273	16	7,488	4·77	357·0	350	Mature	354, 272, 463, 421	Glen Leigh Bounty
Clarke, F. W., Toora, Jersey (3).										
Mer Vue Choice Soprano 5th	Vol. 31	273	N.C.K.	5,312	6·26	332·4	250	Sr. 2	.. ..	Mer Vue Jupiter
Mer Vue Lilac's Petal ..	Vol. 31	273	N.C.K.	6,101	6·38	389·0	250	Sr. 2	.. ..	Mer Vue Jupiter
Mer Vue Trinket 3rd ..	C.R.	273	N.C.K.	5,354	5·88	314·6	230	Jr. 2	.. ..	Mer Vue Jupiter
Clark, P. W., and Son, Whittlesea, Jersey (2).										
Coodardy Gentle Annette 6th	61158	273	18½	8,051	5·27	424·3	350	Mature	318, 469 ..	Staghorn Lord Aidan 3rd
Mornmont Golden Cream 2nd	77851	273	20	8,624	5·52	476·4	270	Jr. 3	286 ..	War Valour (Imp.)
Colenso, L. W. R., Alvis, Jersey (12).										
Normandie Golden Nancy	49868	273	18	7,553	5·56	420·1	350	Mature	352, 356, 352, 374, 396, 538, 482	Normandie Golden Peer
Normandie Golden Nancy 4th	78132	273	23	7,869	6·13	482·2	290	Sr. 3	315 ..	Normandie Majestic
Normandie Hawthorn 12th	63438	273	22	10,299	5·30	546·2	350	Mature	180, 401, 347, 533, 529	Normandie Mayflower's Fancy Masterpiece
Normandie Hawthorn 15th	68361	273	10½	9,182	4·90	449·7	350	Mature	303, 306, 557, 588	Lewisham Playboy
Normandie Hawthorn 24th	Vol. 30	240	4	5,805	4·49	260·9	230	Jr. 2	.. ..	Normandie Majestic
Normandie Hawthorn 26th	Vol. 30	273	11	4,218	4·97	209·8	230	Jr. 2	.. ..	Lewisham Playboy
Normandie Ilma 14th ..	83190	273	17	5,841	4·91	286·7	250	Sr. 2	.. ..	Normandie Majestic
Normandie Mayflower 14th	78139	273	13½	5,876	4·55	267·6	290	Sr. 3	247 ..	Lewisham Playboy
Normandie Mayflower 16th	Vol. 30	273	12	3,696	5·30	196·0	230	Jr. 2	.. ..	Lewisham Playboy
Normandie Primrose 8th ..	83195	273	20	8,662	4·81	416·3	270	Jr. 3	368 ..	Normandie Majestic
Normandie Primrose 9th ..	Vol. 30	273	8	4,914	5·31	261·1	230	Jr. 2	.. ..	Lewisham Playboy
Normandie Thelma 8th ..	78140	273	20½	7,446	4·86	362·1	290	Sr. 3	282 ..	Lewisham Playboy
Coulthard, J. J., Whittlesea, Jersey (6).										
Walamba Clarabelle ..	Vol. 30	273	10	5,355	5·21	279·2	230	Jr. 2	.. ..	Airlie Don
Walamba Lady	64779	273	9½	6,966	5·31	369·7	350	Mature	294, 274, 336, 422, 277, 345, 415	Banyule Airo
Walamba Lady Brae ..	84423	273	5	4,920	5·42	266·7	290	Sr. 3	239 ..	Airlie Don
Walamba Lily	84424	273	9	4,373	5·18	226·4	310	Jr. 4	227, 288 ..	Clarendon Eyre Brigadier 3rd
Walamba Linda	84425	273	8	3,987	4·78	190·7	270	Jr. 3	277 ..	Clarendon Eyre Brigadier 3rd
Wompini Lady Grey ..	64957	273	7½	5,066	5·80	293·7	350	Mature	294, 268, 330, 298	Wompini Eri King

Name of Cow.	Herd Book No.	No. of Days in Test.	Milk Last Day of Test. lb.	Milk. lb.	Average Test.	Butter Fat. lb.	Standard Required.	Class.	Previous Yields of Butter Fat.	Sire.
Cowan, G. L. S., Bacchus Marsh, Friesian (1).										
Upper Lappan Beauty ..	Vol. 15	273	N.C.K.	10,583	3·40	359·5	250	Sr. 2	.. ..	Upper Lappan Pontiac
Cuddihy, T. D., Geelong, Jersey (3).										
Mount Violet Colleen's Kyeema	54278	273	11	5,661	4·85	274·8	350	Mature	346, 386 ..	Ballara Admiral
Mount Violet Fairy Madeira	72974	240	4	5,385	4·60	247·8	350	Mature	352, 334 ..	Mount Violet Madeira's Count
Pine Ridge Silvermine 9th	83474	273	7	3,428	5·22	178·8	250	Sr. 2	.. ..	Belgonia Magnetic Chief
Department of Agriculture, Werribee, Friesian (8).										
Victoria Coralie	Vol. 15	273	N.C.K.	8,642	3·58	309·2	230	Jr. 2	.. ..	Rupertswood Dutch Prince
Victoria Gressa	Vol. 15	273	N.C.K.	9,252	3·59	332·4	230	Jr. 2	.. ..	Terling Hypothesis (Imp.)
Victoria Jostle	Vol. 15	273	N.C.K.	11,999	3·87	464·8	270	Jr. 3	.. ..	Rupertswood Dutch Prince
Victoria Madeline ..	Vol. 15	273	N.C.K.	13,790	3·37	465·1	270	Jr. 3	326 ..	Victoria Conductor
Victoria Primula ..	Vol. 15	210 (Sold)	..	5,925	4·19	248·0	270	Jr. 3	327 ..	Victoria Conductor
Victoria Sonorus Piebe ..	4289	273	N.C.K.	16,857	3·09	520·7	350	Mature	441, 418, 421, 583, 493, 493, 555	Victoria Topnote
Victoria Tear	Vol. 15	273	N.C.K.	8,856	3·92	347·0	250	Sr. 2	.. ..	Rupertswood Dutch Prince
Victoria Woodcrest Josie ..	6103	273	N.C.K.	12,216	3·65	445·3	350	Mature	313, 403, 412	Rupertswood Inka Jo
Department of Agriculture, Werribee, Red Poll (13).										
Victoria Bluebird ..	Vol. 12	273	N.C.K.	7,542	4·73	356·8	330	Sr. 4	340, 389 ..	Woodburn Peter Pan
Victoria Cheer	C.R.	273	N.C.K.	6,852	4·70	322·2	230	Jr. 2	.. ..	Woodburn Peter Pan
Victoria Cinder	C.R.	273	N.C.K.	7,941	4·25	337·7	230	Jr. 2	.. ..	Burnwood Masterpiece
Victoria Decreet	3902AA	273	N.C.K.	8,474	3·87	327·9	350	Mature	253, 284, 327, 347, 403, 257	Victoria Iraq
Victoria Electricity ..	Vol. 12	273	N.C.K.	9,975	4·58	456·6	290	Sr. 3	365 ..	Victoria Robin Hood
Victoria Lock	Vol. 12	273	N.C.K.	9,084	4·15	377·1	290	Sr. 3	289 ..	Victoria Peterology
Victoria Marionette ..	C.R.	273	N.C.K.	8,718	4·22	367·8	230	Jr. 2	.. ..	Burnwood Masterpiece
Victoria Pan Pert ..	C.R.	273	N.C.K.	7,214	4·25	306·3	230	Jr. 2	.. ..	Woodburn Peter Pan
Victoria Passion ..	Vol. 12	273	N.C.K.	7,517	3·50	263·2	290	Sr. 3	241 ..	Burnwood Masterpiece
Victoria Rosebloom ..	7587AA	273	N.C.K.	6,858	4·16	285·6	310	Jr. 4	330, 258 ..	Woodburn Peter Pan
Victoria Rosely	Vol. 12	273	N.C.K.	6,865	4·68	325·9	230	Jr. 2	.. ..	Woodburn Peter Pan
Victoria Stiletto	7972A	240 (Sold)	..	5,202	4·98	259·4	330	Sr. 4	300, 229 ..	Woodburn Peter Pan
Victoria Vitabrit ..	Vol. 12	273	N.C.K.	8,370	3·71	311·0	290	Sr. 3	248 ..	Victoria Peterology
Desmond, J. J., Rochester, Jersey (2).										
Macroom Lovebird 6th ..	Vol. 30	273	N.C.K.	8,064	5·94	479·2	330	Sr. 4	.. ..	Clifford Farm Robin Adair
Macroom Lovelie's 3rd ..	82589	273	N.C.K.	7,295	5·34	389·4	290	Sr. 3	238 ..	Clifford Farm V.C's. Skipper
Devon Park Stud Farm (G. S. Daley), Lilydale, Jersey (6).										
Belgonia Marie 10th ..	70239	273	21½	8,180	4·99	408·4	350	Mature	268, 362, 380	Aim High (Imp.)
Devon Park Pacemaker's Melody	Vol. 30	273	13	7,064	5·59	394·6	230	Jr. 2	.. ..	Karrara Pacemaker
Devon Park Standard Eileen 2nd	Vol. 30	273	15½	5,342	6·32	337·8	230	Jr. 2	.. ..	Brampton Sporting Standard (Imp.)
Karrara Fancy Madeira ..	67354	273	33	10,734	6·06	650·4	350	Mature	446, 652, 583, 613	Victorious Pioneer
Karrara Inspiration ..	77080	273	4½	4,619	5·92	273·3	310	Jr. 4	288, 429 ..	Brampton Great Boy (Imp.)
Karrara Perree's Music ..	77083	273	21	8,753	5·77	505·3	330	Sr. 4	426, 439 ..	Springhurst Perree's Quality
Dookie Agricultural College, Dookie, Ayrshire (7).										
Dookie Adorn	32241	273	N.C.K.	8,249	3·87	319·2	350	Mature	324, 360, 387	Tregorland Indispensible
Dookie Dancer	30380	273	N.C.K.	6,825	4·50	307·1	350	Mature	353, 360, 382, 385	Tregorland Indispensible
Dookie Lobelia	Vol. 36	273	N.C.K.	5,750	4·15	238·7	230	Jr. 2	.. ..	Dookie Radiant
Dookie Pearl	Vol. 36	273	N.C.K.	7,109	3·91	278·0	230	Jr. 2	.. ..	Gowrie Park Bonnie Sailor
Dookie Peon	Vol. 36	273	17½	8,550	4·26	364·5	310	Jr. 4	303 ..	Gowrie Park Bonnie Sailor
Dookie Saffron	Vol. 36	273	8	4,149	4·47	185·5	230	Jr. 2	.. ..	Gowrie Park Bonnie Sailor
Dookie Shirley's Lass ..	32244	273	N.C.K.	6,417	3·80	243·9	350	Mature	263, 360, 355	Tregorland Indispensible
Eltringham, W. B., Lilydale, Jersey (1).										
Clifford Farm Diana ..	70726	273	23½	9,299	5·03	467·6	350	Mature	429, 460, 498	Clifford Farm Danny Boy
Fairchild and Clutterbuck, Tinamba, Jersey (3).										
Fairbank Butterfly 2nd ..	57253	273	N.C.K.	7,004	5·28	369·6	350	Mature	270, 330, 400, 448	Wompini Beau Brummel
Selsey Lotus 3rd ..	73880	273	N.C.K.	8,275	5·08	420·3	350	Mature	341, 397, 398	Brampton Son of Champions (Imp.)
Vaucluse Daphne 5th ..	84383	273	N.C.K.	6,594	5·32	350·6	290	Sr. 3	405 ..	Vaucluse Masterpiece
Fixter, A., Boisdale, Guernsey (1).										
Avon Jean	6729	273	22	7,553	6·06	458·0	350	Mature	351, 417, 382, 481	Kentdale Monogram

Name of Cow.	Herd Book No.	No. of Days in Test.	Milk last day of Test. lb.	Milk. lb.	Average Test.	Butter Fat. lb.	Standard required.	Class.	Previous Yields of Butter Fat.	Sire.
Grice, C. S., Somerville, Jersey (2).										
Glenoma Heroine ..	76448	273	15½	5,079	6·71	340·8	310	Jr. 4	314, 342 ..	Clarendon Eyre Eminent Barrister 9th
Glenoma Lady Blister ..	Vol. 30	273	15	6,246	5·38	336·1	230	Jr. 2	.. ..	Banyule Camber
Handbury, J. E., and Son, Toora, Jersey (3).										
Tooravale Lassie 40th ..	84242	273	N.C.K.	6,324	5·23	330·9	290	Sr. 3	252, 388 ..	Tooravale Noble
Tooravale Lassie 44th ..	Vol. 30	273	N.C.K.	7,388	5·75	424·5	290	Sr. 3	368 ..	Tooravale Noble
Tooravale Lassie 45th ..	Vol. 30	273	N.C.K.	5,013	6·27	314·3	270	Jr. 3	.. ..	Tooravale Noble
Hardie, R., Lardner, Jersey (2).										
Glen Urquart Golden Lass	Vol. 31	273	20	7,041	4·45	313·5	230	Jr. 2	.. ..	Bellefaire Golden Chevron
Glen Urquart Golden Duchess	Vol. 30	273	7	4,011	5·27	211·3	250	Sr. 2	332 ..	Bellefaire Golden Chevron
Harvey, T., Boisdale, Jersey (7).										
Jerseyholm Bluebell 32nd	62304	273	N.C.K.	8,163	6·04	492·7	350	Mature	377, 285, 387	Jerseyholm Master's Fox 35th
Jerseyholm Bluebell 33rd	62305	273	N.C.K.	7,272	5·21	378·9	350	Mature	255, 297, 302, 284	Jerseyholm Master's Fox 35th
Jerseyholm Bluebell 60th	81952	273	N.C.K.	5,780	5·25	303·5	230	Jr. 2	.. ..	Orphanage Molly's Commander
Jerseyholm Bluebell 63rd	81954	273	N.C.K.	6,777	4·59	311·4	230	Jr. 2	.. ..	Mornmoot Memnon 2nd
Jerseyholm Empress 70th	71974	273	N.C.K.	4,809	4·05	194·6	290	Sr. 3	216 ..	Mornmoot Memnon 2nd
Jerseyholm Empress 81st	81962	273	N.C.K.	7,280	4·89	356·3	230	Jr. 2	.. ..	Orphanage Molly's Commander
Jerseyholm Lady Marge 21st	71981	273	N.C.K.	8,149	4·51	367·6	290	Sr. 3	244 ..	Mornmoot Memnon 2nd
Haywood, Dr. A. R., Hastings, Jersey (6).										
Windrest Chevy's Beauty	74576	273	N.C.K.	7,479	5·86	438·2	350	Mature	377, 515, 530	Gadget (Imp.)
Windrest Chevy's Betty ..	Vol. 30	273	N.C.K.	5,608	6·44	361·4	310	Jr. 4	482, 356 ..	Gadget (Imp.)
Windrest Chevy's Charm	60057	273	N.C.K.	6,908	5·55	383·3	350	Mature	254, 396, 377, 551, 558	Glen Iris Montrose Duke
Windrest Chevy's Dainty	74577	273	N.C.K.	7,614	5·28	402·0	350	Mature	357, 533, 497, 461	Gadget (Imp.)
Windrest Chevy's Matilda ..	84589	273	N.C.K.	7,712	5·71	440·3	290	Sr. 3	458 ..	Gadget (Imp.)
Windrest Island Serene ..	79660	273	N.C.K.	4,875	5·76	280·6	330	Sr. 4	462, 493 ..	Gadget (Imp.)
Higgins, J. A. A., Keysborough, Guernsey (2).										
Brighton Vale Sunshine ..	8373	273	12	4,946	4·88	241·6	290	Sr. 3	331 ..	Melbourne Alain D'Or
Kentdale Mavis	7229	273	6	4,682	4·78	221·3	350	Mature	241, 327 ..	Kentdale Anthony
Hodgins, G. E., Hastings, Jersey (1).										
Verjean Venus 2nd ..	74363	273	26	8,314	5·33	443·5	310	Jr. 4	306, 352, 471	Jorian Great Boy
Hore, E., Leitchville, Jersey (4).										
Milvue Aim's Bettwys ..	Vol. 30	273	N.C.K.	6,545	4·67	305·4	230	Jr. 2	.. ..	Belgonia Peggy 11th's Aim
Milvue Aim's Dainty ..	82841	273	N.C.K.	7,153	5·46	390·0	270	Jr. 3	345 ..	Belgonia Peggy 11th's Aim
Milvue Design's Bettwys ..	72839	273	N.C.K.	10,674	4·53	483·4	350	Mature	353, 459, 487	Milvue Rosalind's Ruler
Milvue Larkspur 5th ..	Vol. 30	273	N.C.K.	5,809	5·39	313·0	230	Jr. 2	.. ..	Belgonia Peggy 11th's Aim
Hore, M. T., Horfield, Friesian (2).										
Elmar Fashion	Vol. 15	273	N.C.K.	11,100	3·26	362·4	290	Sr. 3	251 ..	Burnbank Iona Rock
Elmar Lupin	Vol. 15	273	N.C.K.	9,660	3·24	312·7	290	Sr. 3	263 ..	Burnbank Iona Rock
Huffer, J. A., Gormandale, Jersey (1).										
Glenvalley Waverley Lass 12th	Vol. 30	273	N.C.K.	4,578	5·20	237·9	230	Jr. 2	.. ..	Glenvalley President
Hurrey Estate of the late W. H., Koonwarra, Jersey (3).										
Kooreena Carrie 12th ..	Vol. 30	273	15½	6,294	5·20	327·4	330	Sr. 4	328 ..	Kooreena Carrie 4th Laddie
Kooreena Lucy	Vol. 30	273	6	4,371	5·72	250·2	250	Sr. 2	.. ..	Kooreena Audrey 7th's Best
Kooreena Tinkle Belle ..	Vol. 30	273	11½	5,375	5·04	303·2	250	Sr. 2	.. ..	Kooreena Carrie 4th's Laddie
Jackson, H., Lockington, Jersey (4).										
Lockington Starette's Gem	Vol. 31	273	N.C.K.	8,049	5·06	407·1	230	Jr. 2	.. ..	Belgonia Mala
Melvue Aim's Coronation ..	C.R.	273	N.C.K.	8,508	6·20	527·7	250	Sr. 2	.. ..	Belgonia Peggy 11th's Aim
Melvue Aim's Honesty 10th	Vol. 31	273	N.C.K.	6,624	5·64	373·8	230	Jr. 2	.. ..	Belgonia Peggy 11th's Aim
Surrey Buttercup 17th ..	C.R.	273	N.C.K.	7,445	6·02	448·2	230	Jr. 2	.. ..	Orphanage Attraction's Knight
Johnson, F. G., Horsham, Jersey (2).										
Devon Park Standard Daisy	Vol. 30	273	N.C.K.	3,401	5·75	200·7	230	Jr. 2	.. ..	Brampton Sporting Standard (Imp.)
Orphanage Audrey's Molly 9th	78244	273	N.C.K.	5,547	5·35	296·5	350	Mature	.. ..	Retford King Bracken

Name of Cow.	Herd Book No.	No. of Days in Test.	Milk last day of Test. lb.	Milk. lb.	Average Test.	Butter Fat. lb.	Standard required.	Class.	Previous Yields of Butter Fat.	Sire.
Langlands, F. B., Horsham, Jersey (3).										
Brierwood Cora 4th ..	Vol. 30	273	N.C.K.	5,397	5·40	291·5	290	Sr. 3	.. ..	Murona Twylair
Brierwood Golden Maid ..	65637	273	N.C.K.	7,349	5·23	384·5	350	Mature	377, 357 ..	Murona Twylair
Staghorn Fern 2nd ..	78950	273	N.C.K.	4,635	5·35	247·8	350	Mature	350, 260 ..	Staghorn Lord Aldan
Lind, A. E., and Sons, Mount Taylor, Jersey (1).										
Wonga Park Standard Dream	Vol. 30	273	11	4,683	5·95	278·7	270	Jr. 3	280 ..	Brampton Noble Standard (Imp.)
Linke, H. P., Tarrington, Dairy Shorthorn (2).										
Corresdean Beauty ..	1787E	273	26	9,143	3·53	322·3	350	Mature	302, 378 ..	Willow Park Revenue 2nd
Corresdean Fairy ..	1788E	273	21½	9,197	3·52	323·3	310	Jr. 4	251, 269 ..	Drumneil Prince 3rd
Longerenong Agricultural College, Dooen, Ayrshire (1).										
Longerenong Acacia Elata 5th	30753	273	N.C.K.	5,190	4·17	216·3	350	Mature	285, 277, 139	Dookie Punch
Lyon, Estate of the late W. H., Sale, Jersey (1).										
Avon Love Song ..	80043	180 (Herd withdrawn)	..	4,560	6·24	284·6	270	Jr. 3	306 ..	Ruby's Beau (Imp.)
Macauley, C. W., Rochester, Jersey (1).										
Taranah Rainbow 7th ..	Vol. 30	273	N.C.K.	5,172	5·76	298·0	250	Sr. 2	256 ..	Taranah Dignity
McCormack, M., and Sons, Mansfield, Red Poll (11).										
Cypress Blonde	5116C	273	N.C.K.	4,413	4·38	193·3	350	Mature	393, 351 ..	Woodburn Glennie
Cypress Bunty	7695A	273	N.C.K.	4,455	4·59	204·3	270	Jr. 3	.. ..	Burnwood Whistler
Cypress Cherry Plum ..	6387AA	273	N.C.K.	7,589	4·19	317·9	330	Sr. 4	298, 309 ..	Northwood Prior
Cypress Enid	5118C	273	N.C.K.	8,022	4·25	341·3	350	Mature	413, 372 ..	Woodburn Glennie
Cypress Honeytime ..	6391AA	273	N.C.K.	7,152	4·12	294·5	330	Sr. 4	298 ..	Northwood Prior
Cypress Judith	3110B	273	N.C.K.	8,054	3·47	279·1	350	Mature	356, 424 ..	Woodburn Glennie
Cypress Lura 2nd ..	Vol. 12	273	N.C.K.	4,031	3·97	160·2	230	Jr. 2	.. ..	Burnwood Whistler
Cypress Marion	5193D	273	N.C.K.	12,807	3·64	466·0	350	Mature	412, 482 ..	Woodburn Glennie
Cypress Midget	7697A	273	N.C.K.	4,709	4·32	203·5	330	Sr. 4	311, 279 ..	Northwood Prior
Cypress Polynesian ..	8002B	273	N.C.K.	5,532	3·87	214·0	290	Sr. 3	235 ..	Burnwood Whistler
Cypress Wild Plum ..	7700A	273	N.C.K.	5,651	4·04	228·5	250	Sr. 2	.. ..	Burnwood Whistler
McKenzie, Mrs. E. J., and Sons, Woodford, Jersey (1).										
Spring Valley Rose Dream 3rd	Vol. 30	273	20½	5,953	5·04	299·8	230	Jr. 2	.. ..	Selsey Gay Prince
McNabb, G. A., and Son, Irrewillipe East, Jersey (18).										
Greenwood Pastime ..	71665	273	N.C.K.	7,160	5·95	425·7	330	Sr. 4	316, 362 ..	Selsey Maranta's King
Greenwood Plunder ..	71671	273	N.C.K.	5,796	6·06	351·0	330	Sr. 4	388, 339 ..	Greenwood Jimmy
Maxon Bright Alsyke 4th	Vol. 30	273	N.C.K.	3,722	6·22	231·5	230	Jr. 2	.. ..	Maxon Bright Duke
Maxon Bright Daisy 4th ..	72712	273	N.C.K.	6,401	5·17	331·1	330	Sr. 4	309, 330 ..	Maxon Starbright's Prince 5th
Maxon D's Cornice ..	82702	273	N.C.K.	5,583	5·87	328·0	270	Jr. 3	269 ..	Maxon Count's Dawn
Maxon D's Clara 2nd ..	Vol. 30	273	N.C.K.	4,868	4·69	228·4	230	Jr. 2	.. ..	Maxon Count's Dawn
Maxon Handsome Goldfinch	82716	273	N.C.K.	5,111	6·26	320·0	250	Sr. 2	371 ..	Maxon Handsome Boy
Maxon Handsome Light ..	77632	273	N.C.K.	7,598	5·52	419·6	290	Sr. 3	294, 358 ..	Maxon Handsome Boy
Maxon Lady Starbright ..	Vol. 30	273	N.C.K.	3,725	5·69	211·9	230	Jr. 2	.. ..	Mornmoot Madeira's Viceroy
Maxon Madeira's Bouvardia	Vol. 30	273	N.C.K.	3,987	5·47	218·1	230	Jr. 2	.. ..	Avalon Prince Madeira 26th
Maxon Madeira's Buttercup	Vol. 30	273	N.C.K.	4,265	5·71	243·6	230	Jr. 2	.. ..	Avalon Prince Madeira 26th
Maxon Madeira's Favourite 2nd	Vol. 30	273	N.C.K.	5,964	4·50	268·2	230	Jr. 2	.. ..	Avalon Prince Madeira 26th
Maxon Madeira's Light 2nd	Vol. 30	273	N.C.K.	4,844	5·19	251·5	230	Jr. 2	.. ..	Avalon Prince Madeira 26th
Maxon Noble's Ranunculus 2nd	67854	273	N.C.K.	10,449	5·28	552·2	350	Mature	400, 444, 491, 540	Maxon Duchess' Noble
Maxon S.B's Alsyke ..	82724	273	N.C.K.	5,476	5·62	308·0	250	Sr. 2	249 ..	Maxon Pansy's Starbright
Maxon S.B's Light ..	Vol. 30	273	N.C.K.	4,530	4·60	208·5	230	Jr. 2	.. ..	Maxon Light's Starbright
Maxon Starbright Pansy 3rd	Vol. 30	273	N.C.K.	4,365	5·51	240·6	230	Jr. 2	.. ..	Maxon Light's Starbright
Mornmoot Lady Starbright 2nd	68091	273	N.C.K.	6,894	5·20	358·6	310	Jr. 4	353, 377 ..	Werribee Viceroy
Maloney, P. J., Tongala, Jersey (1).										
Belgonia Junette 9th ..	75110	273	N.C.K.	6,821	6·40	436·6	290	Sr. 3	442 ..	Aim High (Imp.)
Manly, R. A. A., Somerville, Dairy Shorthorn (1).										
Trenavin Park Belle ..	C.C.	210	4	4,845	3·62	175·6	200	Sr. 3	.. ..	Liberton Patroit 4th
Mason, V. J., Ferntree Gully, Guernsey (2).										
Osmanie Janet	7712	273	N.C.K.	7,970	4·76	379·6	350	Mature	411, 316 ..	Yarraview Nightmarch
Osmanie Primrose ..	11203	240 (Herd withdrawn)	..	4,860	5·49	266·8	230	Jr. 2	.. ..	Yarraview Masher

Name of Cow.	Herd Book No.	No. of Days in Test.	Milk last day of Test. lb.	Milk. lb.	Average Test.	Butter Fat. lb.	Standard required.	Class.	Previous Yields of Butter Fat.	Sire.
Masters, S. H., and Son, Swan Hill, Jersey (1).										
Rutland Lady	Vol. 30	273	17	5,330	6·39	340·7	230	Jr. 2	.. ..	Pine Ridge Rex
Mitchell, R. H., Linton, Jersey (6).										
Clifford Farm Estelle ..	Vol. 31	273	23	6,954	5·34	371·1	230	Jr. 2	.. ..	Clifford Farm Sergeant Major
Clifford Farm Lotus ..	80742	273	28	9,249	5·82	538·5	270	Jr. 3	479 ..	Tavistock Quality Lord
Clifford Farm Mavis ..	80743	273	23½	7,482	5·48	409·9	270	Jr. 3	358 ..	Clifford Farm Lucky Boy
Clifford Farm Sandra ..	Vol. 30	273	28	8,769	5·11	448·1	230	Jr. 2	.. ..	Clifford Farm Leo
Clifford Farm Shirley ..	75665	273	21	7,023	5·57	391·4	330	Sr. 4	391, 411 ..	Clifford Farm Danny Boy
Clifford Farm Viola ..	61103	273	21½	6,800	5·84	396·9	350	Mature	317, 401, 467, 481	Wompini V.C.
Moore, J., and Co., Yarram, Jersey (8).										
Clarendon Eyre Camille 11th	56799	273	N.C.K.	5,789	4·90	283·6	350	Mature	298, 336, 477, 289, 279, 417	Victorious Pioneer (Imp.)
Tooloonook Camille 2nd ..	79248	273	N.C.K.	6,129	4·94	302·9	310	Jr. 4	172, 344 ..	Belgonia Lady's Duke
Tooloonook Camille 3rd ..	84232	273	N.C.K.	6,218	4·76	295·7	270	Jr. 3	338 ..	Belgonia Junette 2nd's Design
Tooloonook Molly 16th ..	69398	273	N.C.K.	5,979	5·49	328·5	350	Mature	267, 203, 260, 174	Latrobe Musician
Tooloonook Molly 19th ..	79252	273	N.C.K.	5,721	5·15	294·6	330	Sr. 4	197, 466 ..	Belgonia Lady's Duke
Tooloonook Onyx ..	69399	273	N.C.K.	5,325	4·95	263·4	350	Mature	302, 248, 272, 356	Rydon Premier
Tooloonook Peach 21st ..	C.R.	273	N.C.K.	4,395	5·33	234·3	230	Jr. 2	.. ..	Belgonia Junette 2nd's Design
Tooloonook Sainfoin 7th ..	74216	273	N.C.K.	6,237	5·13	319·9	350	Mature	184, 203, 395	Belgonia Lady's Duke
Nicholas, M. A., Sherbrooke, Jersey (2).										
Selsey Royal Lily ..	73882	273	19	7,618	4·87	371·0	330	Sr. 4	358, 309 ..	Selsey Right Royal
Selsey Tally 2nd ..	60073	273	12½	5,931	5·14	304·6	350	Mature	297, 279 ..	Brampton Sporting Standard (Imp.)
Noonan, G., Benalla, Jersey (1).										
Noonavale Silvermine Two	Vol. 31	273	15	5,155	5·78	297·8	250	Sr. 2	.. ..	Belgonia Perree
O'Neill, J., Echuca Village, Jersey (1).										
Fourshell's Yvette ..	38349	273	20	6,420	4·91	315·0	350	Mature	490, 436, 405, 374, 365, 374, 392, 405	Belgonia Propeller
Parker, L. M., Tallarook, Dairy Shorthorn (8).										
Deep Dale Beauty 3rd ..	C.C.	273	25	9,825	3·57	351·2	290	Sr. 3	290 ..	Willow Park Barrington 26th
Deep Dale Blossom 2nd ..	C.C.	273	16	6,918	3·89	269·2	230	Jr. 2	.. ..	Willow Park Imperial Cran 34th
Deep Dale Daphne ..	1806E	273	30	11,137	3·88	431·8	350	Mature	439, 374, 348	Willow Park Banker 3rd
Deep Dale Peach ..	1813E	273	21	10,311	4·05	417·1	350	Mature	433, 430 ..	Willow Park Revenue
Deep Dale Polly 3rd ..	C.C.	273	15½	9,977	4·16	414·9	290	Sr. 3	279 ..	Willow Park Barrington 26th
Deep Dale Rachel 2nd ..	C.C.	273	18	8,786	3·43	301·3	270	Jr. 3	274 ..	Willow Park Barrington 26th
Deep Dale Rose	1818E	273	14½	8,909	3·65	325·1	330	Sr. 4	328, 362 ..	Willow Park Barrington 26th
Deep Dale Strawberry ..	1821E	273	6½	9,454	3·04	287·7	350	Mature	232, 396, 260	Willow Park Barrington 26th
Pattison, G., Tongala, Ayrshire (3).										
Willow Park Juliet ..	Vol. 36	273	19	6,512	4·14	270·0	270	Jr. 3	333 ..	Glengowrie Jasper
Willow Park Laurette ..	Vol. 36	273	23	7,871	3·94	310·3	270	Jr. 3	264 ..	Glengowrie Jasper
Willow Park Rosina ..	26810	273	12	8,829	4·32	381·8	350	Mature	278, 376, 355, 347, 324, 317, 326	Fulham Beam
Payne, A. E. T., Lilydale, Guernsey (5).										
Yarraview Clarabelle ..	8200	273	26½	9,380	4·62	433·4	350	Mature	337, 403, 425, 400	Honoria's Benefactor (Imp.)
Yarraview De Luxe ..	8203	273	36	11,619	4·86	564·3	350	Mature	423, 488, 452	Honoria's Benefactor (Imp.)
Yarraview Essie ..	5169	273	27	9,803	5·08	498·1	350	Mature	292, 346, 583, 510, 513, 517, 586	Camilla's Majestic of Maple Lodge (Imp.)
Yarraview Remembrance	11972	273	24	6,813	4·91	334·2	250	Sr. 2	.. ..	Camilla's Majestic of Maple Lodge (Imp.)
Yarraview Roulette ..	9789	273	21½	7,986	5·29	422·4	290	Sr. 3	465, 453 ..	Sun Rose of Maple Lodge (Imp.)
Phillips, J. H., Swan Hill, Jersey (2).										
Ryland's Lavene ..	83823	273	28	9,686	4·98	482·1	290	Sr. 3	251, 344 ..	Banaview Master
Ryland's Nanette ..	64160	273	20½	8,282	4·87	403·0	350	Mature	236, 322, 350, 434, 446	Orphanage Zaffarine Prince

Name of Cow.	Herd Book No.	No. of Days in Test.	Milk last day of Test. lb.	Milk. lb.	Average Test.	Butter Fat. lb.	Standard required.	Class.	Previous Yields of Butter Fat.	Sire.
Powell, T. S., Mansfield, Jersey (1).										
Carellen Golden Cream 4th	Vol. 30	273	14	4,364	5·06	221·0	230	Jr. 2	.. ..	Werribee Planet
Read, Estate of the late J. D., Springhurst, Jersey (22).										
Springhurst Anemone's Duchess	73921	273	12½	5,232	5·29	276·8	310	Jr. 4	339, 394 ..	Glen Iris Anemone's Standard
Springhurst Blonde Nardoo	59485	273	18	8,297	6·21	515·6	350	Mature	318, 488, 448, 519, 520	Bellefaire Seaborn Successor
Springhurst Blonde Romneya	55272	273	11	4,610	6·15	283·7	350	Mature	377, 399, 523, 463, 526, 555	Bellefaire Seaborn Successor
Springhurst Boutillere ..	64270	273	19	7,593	5·18	393·6	350	Mature	336, 424, 458, 490	Glen Iris Anemone's Standard
Springhurst Brampton Tulip	64274	240	4	4,740	4·68	222·0	350	Mature	281; 263, 363, 433	Glen Iris Anemone's Standard
Springhurst Golden Tulip	83938	273	15	5,795	4·65	269·4	230	Jr. 2	.. ..	Springhurst Noble Oak
Springhurst Golden Yarran	83939	273	8	4,409	4·81	212·0	230	Jr. 2	.. ..	Springhurst Noble Oak
Springhurst Napoleonette Alsyke	83940	273	14½	5,097	5·75	293·0	230	Jr. 2	.. ..	Bellefaire Superlative Pride
Springhurst Philidora's Alsyke	73928	273	5	4,275	5·19	221·8	310	Jr. 4	375, 398 ..	Twin Oaks Ashley Fern's Noble (Imp.)
Springhurst Philidora's Narcissus	73929	273	15	6,807	5·06	344·5	290	Sr. 3	343, 434 ..	Twin Oaks Ashley Fern's Noble (Imp.)
Springhurst Pride's Tulip	83944	273	11	3,288	5·55	182·5	230	Jr. 2	.. ..	Bellefaire Superlative Pride
Springhurst Ronald's Alsyke	59498	273	15	7,607	5·77	439·3	350	Mature	365, 545, 435, 579, 567	Bellefaire Seaborn Successor
Springhurst Ronald's Duchess	64283	273	17	7,794	5·23	407·5	350	Mature	495, 549, 555, 522	Springhurst Sybil's Successor
Springhurst Soeurette Alsyke	78941	273	8	5,324	5·59	297·5	270	Jr. 3	358 ..	Bellefaire Superlative Pride
Springhurst Soeurette Nightshade	83945	273	15	5,354	5·49	293·9	230	Jr. 2	.. ..	Bellefaire Superlative Pride
Springhurst Soeurette Tecoma	78942	273	13	5,146	5·73	295·0	270	Jr. 3	332 ..	Bellefaire Superlative Pride
Springhurst Soeurette Tulip	73931	273	14	7,053	4·85	341·9	310	Jr. 4	402, 502 ..	Bellefaire Superlative Pride
Springhurst Superlative Tecoma	83947	273	11	4,695	5·53	259·6	230	Jr. 2	.. ..	Bellefaire Superlative Pride
Springhurst Superlative Tulip	83948	273	10	4,925	5·87	288·9	230	Jr. 2	.. ..	Bellefaire Superlative Pride
Springhurst Sybil Tulip ..	55281	273	9	5,162	5·49	283·4	350	Mature	329, 425, 492, 513, 450, 469, 387	Springhurst Golden Gamboge
Springhurst Volunteer's Nardoo	73934	273	18½	6,366	6·18	393·2	290	Sr. 3	352, 448 ..	Springhurst Tomatoe's Volunteer
Springhurst Wexford Narcissus	78946	273	14½	5,622	5·45	306·2	250	Sr. 2	288 ..	Twin Oaks Ashley Fern's Noble (Imp.)
Reid, Miss B. B., Bundoora, Jersey (7).										
Jubilee Datura	62340	273	16	7,074	4·54	321·4	350	Mature	297 ..	Werribee Stylish Masterpiece
Jubilee Epagris	72006	273	13	5,288	5·29	279·7	330	Sr. 4	275 ..	Jubilee Richlight
Jubilee Lasteena ..	Vol. 30	273	14½	5,388	4·93	265·8	270	Jr. 3	.. ..	Jubilee Waxenlight
Jubilee Lepturus ..	Vol. 30	273	10	3,887	5·05	196·1	230	Jr. 2	.. ..	Jubilee Lanelight
Jubilee Libonia	62343	273	13	6,641	4·82	320·2	350	Mature	407 ..	Werribee Stylish Masterpiece
Jubilee Linette	67240	273	15	6,965	4·53	315·6	350	Mature	228 ..	Werribee Stylish Masterpiece
Jubilee Wintergreen ..	76990	273	12	4,740	5·69	269·5	330	Sr. 4	225 ..	Jubilee Allight
Ross, D. M., Croydon, Dairy Shorthorn (10).										
Willow Park Blush 14th ..	1501C	273	10	7,526	3·23	243·3	290	Sr. 3	242 ..	Anderson Imperial Cran 6th (Imp.)
Willow Park Comet 26th ..	1656D	273	4	5,382	3·25	174·9	290	Sr. 3	297 .	Anderson Imperial Cran 6th (Imp.)
Willow Park Comet 34th ..	C.C.	273	16	6,983	3·07	214·4	250	Sr. 2	.. ..	Anderson Imperial Cran 6th (Imp.)
Willow Park Dainty 21st ..	C.C.	273	12	5,781	3·59	207·5	250	Sr. 2	.. ..	Anderson Imperial Cran 6th (Imp.)
Willow Park Damsel 12th ..	1522C	273	8	6,069	3·46	209·8	290	Sr. 3	276 ..	Willow Park Imperial Cran 10th
Willow Park Damsel 14th ..	C.C.	273	14	5,172	3·58	185·3	250	Sr. 2	.. ..	Wicklesham Lord Barrington 5th (Imp.)
Willow Park Duchess 43rd	2046E	273	14	7,223	3·88	280·3	310	Jr. 4	286, 291 ..	Willow Park Barrington 58th
Willow Park Duchess 49th	1678D	273	15½	5,777	3·95	228·0	270	Jr. 3	.. ..	Wicklesham Lord Barrington 5th (Imp.)
Willow Park Duchess 54th	C.C.	273	13	6,360	4·11	261·4	250	Sr. 2	.. ..	Anderson Imperial Cran 6th (Imp.)
Willow Park Melba 38th ..	2048E	273	17	7,509	3·33	249·8	310	Jr. 4	265, 288 ..	Willow Park Barrington 58th

Name of Cow.	Herd Book No.	No. of Days in Test.	Milk Last Day of Test. lb.	Milk. lb.	Average Test.	Butter Fat. lb.	Standard Required.	Class.	Previous Yields of Butter Fat.	Sire.
Smith, R. W., and Son, Swan Hill, Friesian (2).										
Wattle Bank Cremona 3rd	Vol. 15	273	34	11,111	3·86	428·6	350	Mature	368, 382, 412	Hengest Lizzie Segis
Wattle Bank Fairy 4th ..	6112	273	37	13,894	2·95	409·2	350	Mature	378, 359, 390, 488	Wattle Bank Segis De Kol
Stephens, Dr. F. G., Vermont, Guernsey (3).										
Vermont Frances ..	9560	273	23	8,159	5·10	416·3	290	Sr. 3	329 ..	Melbourne Golden Lodestar
Vermont Victoria ..	11749	273	21	6,783	4·70	319·1	250	Sr. 2	.. ..	Melbourne Fleur's Victory
Yarraview Vampire ..	11986	273	9	4,137	5·31	219·6	230	Jr. 2	.. ..	Yarraview Earl
Tait, W. G., Dreelte, Jersey (2).										
Lara Pansy 15th ..	82352	273	16½	6,959	5·09	354·2	250	Sr. 2	314 ..	Avalon Prince Madeira 8th
Stonybank Snowdrop 5th	73964	273	13	5,544	5·52	305·9	330	Sr. 4	298, 444, 395	Mornmoot Marius 2nd
Tandberg, G., and Son, Warragul, Friesian (1).										
Douglas Vale Lady May ..	C.R.	273	16	6,573	3·27	215·0	230	Jr. 2	.. ..	Kelvale Majoe Master
Teychenne and Ducret, Wesburn, Guernsey (2).										
Meadow Vale Lady's Maid	10875	273	18	7,002	4·79	335·1	250	Sr. 2	.. ..	Yarraview Marvel
Meadow Vale Winifred ..	10881	273	10	3,900	6·24	243·5	230	Jr. 2	.. ..	Vermont Prince Johnnie
Thomas and Taylor, Hamilton, Ayrshire (5).										
Jennawar Beauty ..	30709	273	9	10,056	4·37	439·0	350	Mature	290, 329, 359, 377, 370	Denbigh Ace
Jennawar Bettina ..	34707	273	15	7,512	4·45	334·5	270	Jr. 3	310 ..	Denbigh Ace
Jennawar Bunty ..	34708	273	4	5,277	4·65	245·2	270	Jr. 3	266 ..	Denbigh Ace
Jennawar Lily Lady ..	34710	273	17½	8,267	4·13	341·3	270	Jr. 3	306 ..	Denbigh Ace
Jennawar Sylvia 3rd ..	34711	273	16	7,130	4·17	297·3	270	Jr. 3	288 ..	Denbigh Ace
Tomasetti, B. G., Drouin West, Ayrshire (5).										
Emoh Ruo Angie ..	Vol. 36	273	10	6,367	4·18	266·2	290	Sr. 3	296 ..	Emoh Ruo Excellent
Glencorren Design ..	Vol. 36	273	18	8,289	4·08	338·2	230	Jr. 2	.. ..	Glencorren Peerie
Glencorren Edna ..	Vol. 36	273	11½	7,130	4·55	324·1	330	Sr. 4	303, 389 ..	Glenfalloch Comrade
Glencorren Elva	32414	273	16	7,041	4·64	326·5	350	Mature	279, 384, 384, 437	Scotswood Flashlight
Glencorren Goldie ..	Vol. 36	273	12½	6,668	4·35	290·0	270	Jr. 3	270 ..	Glenfalloch Pilot
Trevaskis, F. T., Tongala, Jersey (2).										
Carinya Briar Rose ..	80678	273	N.C.K.	6,252	5·39	336·8	290	Sr. 3	369 ..	Ballara Ideal's Gadget
Grovelea Snowdrift ..	62019	273	N.C.K.	3,393	5·61	190·3	350	Mature	.. ..	Mornmoot Monarch 2nd
Turner, A. J., Yannathan, Jersey (2).										
Finchley Canary 7th ..	81345	273	9	4,145	7·32	303·3	290	Sr. 3	346 ..	Werribee Lord Burnham
Selsey Royal Lotus ..	83880	273	14	5,576	5·43	303·0	250	Sr. 2	341 ..	Selsey Right Royal
Tyssen, C. J., Warragul, Jersey (2).										
Hylsbroke Air Lady 5th ..	76879	210	4	5,475	4·56	249·7	330	Sr. 4	347, 392 ..	Banyule Mollison
Hylsbroke Goldfinch ..	67052	273	16	8,058	5·06	407·6	350	Mature	428, 518 ..	Latrobe Dante
Unthank, Miss Freda, Hastings, Jersey (3).										
The Hollies Fancy 3rd ..	Vol. 30	273	12	5,064	6·24	316·0	250	Sr. 2	269 ..	Gadget (Imp.)
The Hollies Happy ..	84150	273	14	4,744	5·16	244·7	250	Sr. 2	250 ..	The Hollies Chief
The Hollies Queen 5th ..	84152	273	10	4,860	5·78	280·8	270	Jr. 3	310 ..	Windrest Ranee's Lad
Wade, W. J., Stratford, Jersey (4).										
Glen Iris Golden Belle ..	52814	210 (Sold)		5,370	4·74	254·4	350	Mature	294, 229, 378, 392, 381	Designs Golden Oxford (Imp.
Inverbroom Empress 2nd	48762	273	N.C.K.	6,701	4·36	292·4	350	Mature	350, 376, 356, 300, 288, 386, 271	Economist of Aveley
Inverbroom Empress 7th ..	67090	273	N.C.K.	6,621	6·40	423·8	350	Mature	301, 385, 432	Banyule Airport
Inverbroom Ruby's Bunty	57763	273	N.C.K.	7,718	4·76	367·5	350	Mature	228, 233, 351, 412, 409	Grangelea Butterboy 3rd
Walker, C. S., Swan Hill, Jersey (3).										
Warwick Polly 10th ..	64826	273	N.C.K.	10,291	4·97	511·2	350	Mature	327, 348, 484, 649	Glen Iris Golden Lord
Warwick Polly 18th ..	84492	210 (Sold)	..	5,100	4·94	251·7	270	Jr. 3	301 ..	Leven Brae Ideal Masterpiece
Warwick She'll Do ..	79532	180	4	5,340	4·90	261·5	320	Sr. 4	370, 420 ..	Leven Brae A'do Masterpiece

Name of Cow.	Herd Book No.	No. of Days in Test.	Milk Last Day of Test. lb.	Milk. lb.	Average Test.	Butter Fat. lb.	Standard Required.	Class.	Previous Yields of Butter Fat.	Sire.
Waterhouse, H. W. and Son, Pakenham, Jersey (5).										
Navuloa Grand Magnet ..	63357	273	22	7,944	5·14	408·7	350	Mature	455, 479, 475, 399	Werribee Grandmaster
Navuloa Grandmaster's Harebell	63358	273	18	7,929	5·16	409·0	350	Mature	321, 429, 412	Werribee Grandmaster
Navuloa La Magnet ..	68275	273	16	6,402	6·74	431·3	350	Mature	355, 409, 453	Staghorn Laburnum's Masterpiece
Navuloa Magnet's Girlie ..	83103	273	19	6,927	4·82	334·0	250	Sr. 2	268 ..	Navuloa Magnet's Grandmaster
Ovalau Wyandotte ..	78276	273	15	7,517	5·09	382·4	330	Sr. 4	369, 364 ..	Brucevale Wyandotte's King
Whelpton, B., Whittlesea, Jersey (4).										
Coodardy Centurion's Jean	75739	273	17	7,840	4·80	376·5	350	Mature	372, 445 ..	Werribee Centurion
Coodardy Gentle Annette 3rd	61157	273	11	6,175	4·53	279·6	350	Mature	336, 397, 311	Toorongo Belle's Bonaparte
Neerod Buttercup 3rd ..	C.R.	273	12½	4,740	5·68	269·3	230	Jr. 2	.. ..	Neerod Braces
Neerod Butter Mint ..	83106	273	11	4,914	6·08	298·7	270	Jr. 3	267 ..	Neerod Braces
Williams, Estate of the late F. A. Bamawm Extension, Jersey (1).										
Bamawm Fancy Garenne 2nd	75050	273	N.C.K.	8,213	5·98	491·1	350	Mature	475, 543 ..	Bamawm Bonnie Boy
Wilson, A., Port Fairy North, Ayrshire (10).										
Carracoorte Brownie's Petunia	29203	273	12	6,711	4·09	274·6	350	Mature	231, 332, 244, 287	Carracoorte Boomerang
Green Vale Beauty 5th ..	28554	273	27	10,047	3·82	383·7	350	Mature	352, 394, 297, 292	Carracoorte Squire
Lough View Blanche 3rd ..	Vol. 36	273	12½	5,183	4·34	225·1	250	Sr. 2	.. ..	Lough View Bell Lad
Lough View Brownie 3rd ..	34859	273	14	6,617	4·43	292·9	290	Sr. 3	199 ..	Lough View Bell Lad
Lough View Brownie 6th	Vol. 36	273	16	6,876	4·03	277·3	250	Sr. 2	.. ..	Lough View Bell Lad
Lough View Hope ..	35684	273	15	8,034	3·88	311·4	290	Sr. 3	259 ..	Grandview Bernie
Lough View Music 4th ..	Vol. 36	273	15	7,015	4·24	297·7	250	Sr. 2	.. ..	Lough View Bell Lad
Lough View Pearline ..	Vol. 36	273	N.O.C.	5,943	3·97	235·9	250	Sr. 2	.. ..	Lough View Bell Lad
Lough View Petunia 4th ..	Vol. 36	273	N.O.C.	5,978	4·24	253·3	250	Sr. 2	.. ..	Lough View Nubor
Lough View Violet 2nd ..	Vol. 36	210	4	3,540	3·80	134·5	250	Sr. 2	.. ..	Lough View Bell Lad
Woodyer, P. A., Mornington, Jersey (5).										
Glenone Mabel	Vol. 30	273	16	7,691	4·37	336·0	310	Jr. 4	.. ..	Ardleigh Rita's Boy
Selma Millicent	78873	273	10	5,437	6·15	334·4	310	Jr. 4	314 ..	Glen Iris Golden Viol
Selma Petal	C.R.	273	14	4,697	5·60	263·0	230	Jr. 2	.. ..	Glen Iris Golden Viol
Selma Rosemaid	Vol. 30	273	13	4,338	5·40	234·1	230	Jr. 2	.. ..	Glen Iris Golden Viol
Tooradin Beauty ..	Vol. 30	273	20	6,141	5·22	320·4	230	Jr. 2	.. ..	Alawoona Reversion

List of Plants named in the article "Pasture Investigations," published elsewhere in this issue.

Barley Grass	*Hordeum murinum*
Bidgee-widgee	*Acaena Sanguisorba*
Birdsfoot Trefoil	*Lotus major*
Bracken	*Pteridium aquilinum*
Cocksfoot	*Dactylis glomerata*
Hair Grass	*Festuca bromoides*
Heath	*Epacris impressa*
Lucerne	*Medicago sativa*
"Paspalum"	*Paspalum dilatatum*
Perennial Rye Grass	*Lolium perenne*
Ragwort	*Senecio Jacobaea*
Red Clover	*Trifolium pratense*
Sheoak	*Casuarina* spp.
Spear Grass	*Stipa* spp.
Strawberry Clover	*Trifolium fragiferum*
Subterranean Clover	*Trifolium subterraneum*
Ti-tree	*Leptospermum scoparium* *Leptospermum flavescens*
Toowoomba Grass	*Phalaris suberosa*
Tussock Grass	*Poa caespitosa*
Wallaby Grass	*Danthonia* spp.
White Clover	*Trifolium repens*
Wimmera Rye Grass	*Lolium* spp.

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Issued by direction of the Hon. N. A. Martin, M.L.A., Minister of Agriculture.

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The Journal is issued monthly. The subscription, which is payable in advance and includes postage, is 3s. per annum for the Commonwealth and New Zealand, and 5s. for the United Kingdom and Foreign Countries. Single copy, Threepence. Subscriptions should be forwarded to the Director of Agriculture, Melbourne, C.2.

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The postage required for this issue is:—To Australia and New Zealand, 1½d.; to United Kingdom, 2½d.; to United Kingdom via All-sea route, 1½d.; to other British Possessions, 2½d.; to U.S.A. and Foreign Countries, 3½d.

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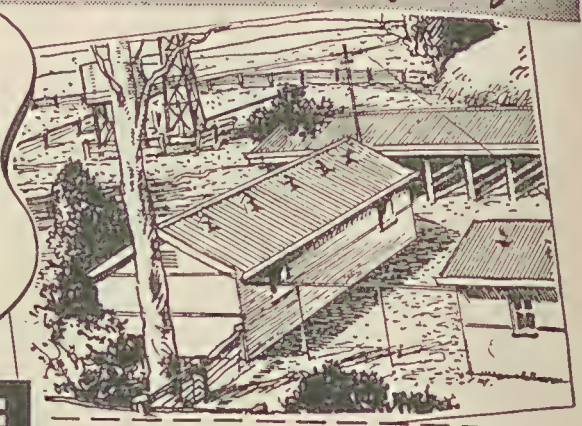

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AN APPEAL to Dairy Farmers for Increased Production

By H. A. MULLETT, B.Agr.Sc., Director of Agriculture

HEAVILY increased demands for dairy produce to fill the needs of the armed forces, and for export to Great Britain, coupled with a sharp decline in production in Australia during the season just ended, have necessitated active official action to step up supplies.

At the recent meeting of the Australian Agricultural Council at Canberra it was decided that dairy produce should be classed as No. 1 priority foodstuff, and that dairy farmers should be given all practicable facilities to enable them to increase the output of their herds.

The Council, which consists of State Ministers of Agriculture and the Federal Minister for Commerce and Agriculture, recommended that increased supplies of modern machinery should be made available to dairymen to offset to the greatest extent possible the shortage of man power. In addition, increased allocations of superphosphate were decided upon and it was decided to divert an additional proportion of stock food for use on dairy farms. Other recommendations concerned the desirability of increasing the man power engaged in the industry.

Statistics placed before the Council revealed that last year there was a general decline in dairy production throughout Australia. This was most marked in Victoria. During 1939-40 production of manufactured dairy produce in Victoria was equivalent to 407,000,000 gallons of whole milk. By 1941-42 it had fallen to 373,000,000 gallons, and it is estimated that this year (1943-44) production will total approximately 312,000,000 gallons, or 23 per cent. below that of 1939-40. The estimated production this year for Victoria is the lowest on record for the past ten years, being even lower than in the dry season of 1938-39.

Many factors have contributed to this decline. The principal causes, however, are loss of man power, declining pastures due to insufficient superphosphate, shortages of stock foods, higher returns in competitive industries, and so on. Some of these deficiencies are being remedied and it should be possible to materially increase production above the present low level.

During the past year efforts have been made to relieve the difficulties under which dairy farmers have been working and, as a result, prospects are that production from this State during 1944-45 can be substantially increased above that of last year, provided seasonal conditions are favorable.

Releases from the armed forces, although considerably below requirements, have enabled over 1,000 men from the Army and Air Force to re-engage in dairying in Victoria, and this should be reflected in increased production during the coming year.

By installing milking machines, dairy farmers have mitigated the labour shortage in regard to milking and shed work. Some further relief should be forthcoming as a result of the new machinery group system, under which agricultural machinery will be made available through the State Department of Agriculture to groups of farmers under a lease agreement to encourage the sowing of fodder crops and to assist in the conservation of meadow and lucerne hay. Dairy farmers should obtain full particulars from their local War Agricultural Committees, and indicate their requirements as early as possible.

Supplies of concentrates during this year have been considerably below demand, but the production of mill offals has shown a marked increase during the past six months, and it is expected that dairy farmers will have less difficulty in obtaining their usual supplies during 1944–45.

The recently-announced increase in the subsidy to be paid to the dairying industry should place the industry on a better financial footing. The price at present being paid for butterfat in Victoria is 2s. per lb., of which 6·7d. per lb. represents subsidy. During the flush months of September to December subsidy will be paid at the basic rate of 4¼d. per lb. The object of the increased subsidy payable during the period of minimum production is to encourage farmers to extend the lactation period of their herds, thus increasing their production.

During the past year, dairy farmers have received priority in the allocation of superphosphate, and in the coming year, provided shipping is available to bring adequate supplies of phosphate rock to Australia, the industry generally should receive at least normal pre-war tonnages of this fertilizer, though its phosphatic content will remain at 18 per cent., instead of 22 per cent. as in pre-war years.

The Department of Agriculture will make a direct appeal for increased production to every dairy farmer in the State. Each will be allotted a definite production goal which, having regard to all the disabilities, it is considered reasonable for him to attain during the coming season.

The production goal for each farm will be computed by Departmental officers and will be based upon the production and size of the herd during the three previous seasons. At the end of each year actual production will be compared with the goal set and due allowance made for any adverse seasonal factors. It is intended also to keep closely in touch with individual farmers with a view to overcoming any disabilities where these can be shown to be impeding production. This plan has been endorsed by the Australian Agricultural Council and its adoption has been strongly recommended to all States.

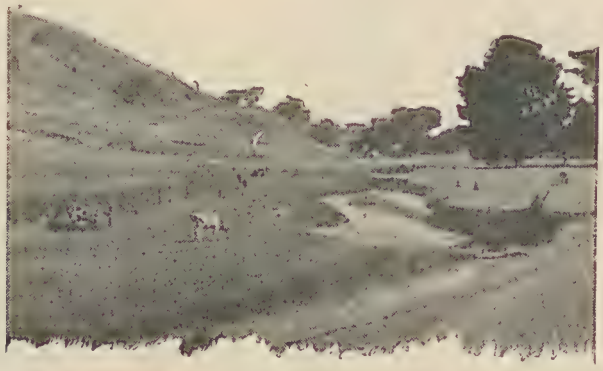
It is realized that this plan can be made effective only by the full co-operation of all parties interested. Dairying industry organizations have readily agreed to co-operate and the Department is at present seeking the co-operation of all factory managements.

All information in regard to production and production goals allotted to farms will be regarded as strictly confidential to the Department and will not become known to others without the consent of the farmer concerned.

It is realized that an increase in the number of cows milked is not possible within a short period of time, therefore, the plan envisages an increase in production during 1944-45 by encouraging the conservation of fodder on the farms and, where practicable, by extending the lactation period of cows already milking by supplementary feeding.

Over a longer period, production may also be increased by an increase in the number and size of herds, by encouragement of herd testing and the use of heifers bred from cattle of proved production.

It is felt that, with the active co-operation of the dairying industry, this plan will have an appreciable effect on production. The Department of Agriculture fully realizes the difficulties under which the industry has been working, but feels sure that dairy farmers in Victoria will respond to the fullest extent to this urgent appeal for increased production.



IRRIGATED PASTURE TESTS

By L. C. BARTELS, B.Agr.Sc., Senior Agrostologist,
and A. MORGAN, B.Agr.Sc., Irrigation Field Officer

Extracts from the Twelfth Annual Report of the experimental pasture work conducted by the Department of Agriculture for the Victorian Pasture Improvement League. The first portion of this report, containing a general review of the pasture situation in 1943, was published in this Journal for June, 1944.

A high-class irrigated pasture in the Kerang district.

THE Pasture Improvement League has helped the Department of Agriculture with tests on irrigated pastures both by furthering the investigations which have been carried on for many years in the Goulburn Valley, and by instituting new work in the Kerang district directed towards the reclamation of "salted" land by the establishment of pastures. The facilities provided by the League for mowing permitted the application of quantitative methods to the different fertilizer tests, and extension work by the Department was facilitated by allocations for extra field assistance and the provision of transport.

Regular mowings of the herbage were made on the manurial test plots at Tongala, Stanhope, McMillans (Cohuna) and at Swan Hill, and were continued until conditions induced by the war, restrictions on travelling and the diversion of officers made it impracticable to go on.

Much information regarding irrigated pastures has been gathered, and in the main it confirms the teachings which have been based on the tests at the State Research Farm, Werribee. That institution sponsored the development of pastures for irrigation in this State, and in a relatively short time the area sown in Victoria has reached 270,000 acres. Only a few hundred acres had been sown in Victoria twenty years ago.

Mixed pastures have stabilized practices in irrigated areas where dairying and sheep farming are carried on. Under good management they have shown themselves to be long-lived and productive; they present variety and continuity of feed to stock and are the cheapest

Pastures such as this are an objective for all good irrigationists.

source of feed. They are flexible because of their mixed composition, and have shown adaptation to all types of soil and to all ranges of climate in Victoria. They grow with the greatest luxuriance in the irrigation districts of northern Victoria. Production from irrigated pastures is sustained, and their greatest attribute is that, in conjunction with the stock they carry, they are soil-fertility regenerators. The oldest pastures under observation which have been properly tended, are the best.

Basically the good irrigation pastures are mixtures of perennial rye grass, cocksfoot and white clover, with strawberry clover an important element in many of them.

Paspalum has come as a volunteer in many of the northern areas.

In the oldest pastures, with the building up of soil fertility, welcome volunteers are prairie grass and Italian rye grass.

Good management as applied to such pastures, connotes regular watering and adequate manuring. Regular watering involves the use of at least 2 feet of irrigation water per annum. A lesser quantity of water or infrequency in watering will influence the composition of the pastures, and where regular watering cannot be undertaken through restricted supplies, mixtures of annuals such as Wimmera rye grass and subterranean clover are recommended. On farms where only partial irrigation is practicable, an area of lucerne makes a good complement to the above.

Comprehensive tests with fertilizers extending over many years show that phosphatic manures are the main requirement for mixed pastures, and superphosphate is the most efficient. Experimental evidence indicates that annual applications of 4 or 5 cwt. of superphosphate per acre are justified, and furthermore there is abundant evidence that this rate of application may be continued with cumulative benefits. Liberal manuring increases production, promotes the growth of superior elements such as white and strawberry clover, induces better growth in the "lean" periods of the year, enhances the feeding value of the pasture, and represses weed growth by the competition of better species.

The extension of topdressing underlies the remarkable growth in pastures in the irrigation areas.

The reclamation of "salted" land has been effectively accomplished by pasture culture. The most notable example is presented in the improved Cohuna irrigation areas, but a big problem awaits solution in the regeneration of the Kerang areas, and the Department of Agriculture in co-operation with the League made a step to that end by the location of an Irrigation Field Officer at Kerang and the inauguration of experiments.

The Officer was diverted to War Agricultural Committee work, with the result that experimental work has been suspended, but encouraging results from earlier advisory work are evident, and prosecution of this work is likely to have valuable economic results calculated to arrest the serious soil degeneration evident over big areas, and to improve production.

The presence of soluble salts in relatively high proportion is a feature of much of the land in the Kerang area, and such a condition calls for the best cultural practice on irrigated farms. It is a fact admitted by farmers of the district that the methods common in the past were bad and underlying future improvement is the need for better practices based on—

Correct irrigation methods.

The choice of suitable crops.

The need for restoring and building up soil fertility.

Correct irrigation methods imply proper layout of land for irrigation. Slowly the approved methods of grading and checkbanking represented by the "border system" of layout are superseding the old wild-flooding methods which were common, and this will make for better utilization of water and regulation of watering to obviate the harm resulting from overwatering.

The choice of suitable crops is governed by conditions. The big areas which are handled and the fact that only partial irrigation is practicable, the necessarily wide intervals between deliveries of water and the debased condition of much of the land makes it impracticable to adopt intensive methods, but improved pastures are so flexible that they are presented as the best agency by which reclamation and development may be achieved.

Soil fertility building is paramount in irrigated agriculture, and this is emphasized because irrigation as practised in the Kerang areas and the Tragowel Plains has been an exhaustive practice. It has been the custom to attribute the degeneration of irrigated land at Kerang to "seepage," to the rise in the water table and to "salt," but it is pertinent to remind people concerned that much of the irrigated land of the north which has gone back has neither "drainage" nor "salt" trouble, and to a large extent these complications are the result of malpractice in the use of water.

The deterioration of pasture land throughout the State was the result of the continued outgoing of mineral elements in the produce from the land—irrigation aggravates this drain, but irrigation is not incompatible with the preservation of fertility. The growth of irrigated pastures on reclaimed salty land at, say, Cohuna is a development which was never anticipated, and they represent in bulk of growth and in sustained carrying capacity of stock a productivity which is a warrant for optimism regarding the stability of irrigation. Earlier experiences gave rise to grave doubts on that matter.

Two plots have been retained as observation plots at Tragowel and Koroop and are reported on.

Kerang "Salted" Land. Reclamation by Irrigated Pasture Culture.

A. Tragowel.

The Tragowel plot has been most successful. When first taken over by the Department of Agriculture for trials of pasture species, the area was densely infested with Dillon bush. Although the bushes were relatively small, the carrying capacity represented by the few patches of uninfested ground was negligible, and further, most of the bare patches were heavily impregnated with alkali. Severe grading was required to put the area into a condition suitable for efficient irrigation, and owing to the isolation of the plot in an area of approximately 4,000 acres of "Dillon bush" and "lignum", rabbits were very numerous. The water-table position was fairly satisfactory, as bores put down before grading was commenced showed that the ground-water remained comparatively stationary at a depth of 4 to 6 feet from the surface. No irrigation had been carried out in the vicinity of the plot for some years. Fertility was low in terms of phosphate, as there was no record of any top-dressing of the pasture of barley grass, trefoil, and various halophytes having been done prior to the neglect which followed the appearance of "salt" in the district.

Preliminary trials of cereals and pasture species, after a first grading, gave very promising results, but it was soon obvious that the plot would have to be wire-netted if any permanent progress was to be made. After the rabbits had been excluded, a final grading of half the area was completed, and permanent sowings of permanent pasture, lucerne, Rhodes

A luxuriant growth of perennial rye grass and irrigation white clover at Dingee.

grass, paspalum dilatatum, phalaris tuberosa, and Wimmera rye grass-subterranean clover were made in the autumn of 1941. Germination was excellent in spite of lack of rainfall, which necessitated watering to start growth. Apart from some scouring which resulted from the slope of the ground and the fineness of the soil after grading, germination was very even, and by the autumn of 1942 excellent pastures comprising all the species normally used for irrigated culture were firmly established.

Following this, labour problems due to the war became serious, and it was impossible to get assistance in grading and sowing the remaining section. Mr. D. McIntosh, who has been responsible for the field work on the plots since the death of Mr. J. K. McIntosh, agreed to arrange for this work, and when grading was completed the area was sown with lucerne in the autumn of 1943. This was a bad year, and the strike obtained was patchy, although a prolific growth of barley grass and trefoil occurred.

The grazing figures for the area are not presented here because they convey little idea of the carrying capacity of the pasture area. It was found advisable to subdivide the plot into three small paddocks, and these were rotationally grazed in conjunction with 4 acres adjoining the plot—this four acres was graded in 1942 and 1943, and sown with Wimmera rye grass and subterranean clover in 1943.

Hay estimated at 1 ton per acre was cut from the Wimmera rye grass-subterranean clover area of the pasture plot in the spring of 1943.

An interesting feature of the plots has been the gradual spread of the Dingee irrigation white clover and the Clunes perennial rye grass from the permanent pasture bays to other bays in the area. This has been brought about by top dressing and attention to regular watering. From present indications it seems that the whole area will ultimately develop into a white clover-perennial rye grass paddock, although at the present time the lucerne and other species are still vigorous. Cocksfoot, which is so often stated to be unsuited to irrigation conditions in the hot northern climate, has done remarkably well, and is steadily improving in vigour and conspicuousness Cowgrass included in the pasture mixture was prominent in the first season, but is now very difficult to find. This species is apparently very intolerant of alkali, and the results at Tragowel support earlier and more detailed observations made at the plot at Kerang East which, owing to war conditions, was abandoned in 1943.

Farmers in the Tragowel district, under the leadership of those who have experimented successfully with pastures and lucerne, have realized the value of the plot to the district, and recently arranged a field day which was attended by a large number of land holders.

B. Koroop.

The Koroop plot, on the property of Mr. D. J. Smith, is an entirely different venture to the Tragowel plot.

It is located in low land sloping away from the Pyramid Creek, has a very high water-table (24 to 30 inches), and at the time of selection was uniformly and highly alkali-affected. In summer the surface soil consisted of soft, fine dust; in winter and after irrigation this dusty layer changed to sticky, slippery mud. Vegetation was almost exclusively halophytic, with "seablite" predominating. Conditions were too difficult for the growth of Dillon bush.

Under the circumstances, this plot has been regarded as a long-term proposition in regard to the establishment of pasture species. Preliminary trials were designed to estimate the efficiency of different methods of irrigation and of varying frequencies of irrigation. The border-check system was compared with a modified ponding system, and in each case the frequency of irrigation varied from fortnightly to monthly waterings in a summer irrigation series, while autumn and spring waterings were included to test the effect of irrigation in inducing the growth of winter annuals such as barley grass.

In the first two years, seedings of millet and Wimmera rye grass were tried, but with no success, and although manurial trials were continued it was decided that further experiments with seeding of cereals, &c., were useless. The original plan of experimentation with varying frequencies of watering was also found to be unsatisfactory because of seepage effects between the different bays, and watering was reduced to autumn and spring irrigation of the whole area. Prior to this change, however, it was clearly demonstrated that reclamation was proceeding at the most rapid rate on those areas which during the irrigation season received the greatest amount (total) of irrigation water. Thus the "ponded fortnightly" plots

were most improved, and were followed by the "fortnightly watered" bays on the border-check system.

The conclusion reached in regard to this plot was that it would be necessary to bring the soil back to a state fit for the growth of barley grass (*Hordeum maritimum*) before any satisfactory seeding of pasture species (e.g., Wimmera rye grass) could be done. At the present time "seablite" remains the dominant species, but patches of barley grass are establishing and increasing.

Under ordinary circumstances land holders would not attempt the reclamation of this type of land while higher land in a less "salty" state was available. It is impossible to predict how long it will be before the barley grass becomes the dominant species and indicates that ordinary pasture improvement methods can be employed.

List of (47) Existing Experimental Plots conducted by the Department of Agriculture for the Victorian Pasture Improvement League

A. Non-Irrigated Pastures—

5. *Major Plots* (including mowing* and grazing manurial sections and species trials)—

   Larpent, Cudgee, Cobrico, Glenormiston North. Caldermeade.

11. *Auxiliary Mowing* Trials* (potash and lime investigations)—

   Colac West, Larpent Park, Cobden North, Cobden East, Cobden West, Warragul North, Warragul South, Lardner, Limonite, Mirboo North, Mardan.

2. *Pasture Establishment Trials* —

   Trawalla and Hamilton.

3. *Experimental Plots* (including mowing* and grazing section manurial)—

   Benalla, Wangaratta, Kergunyah.

2. *Grazing Manurial Trials*—

   Ellinbank and Pirron Yallock.

1. *Experimental Plot* (mowing* manurial trial—Serpentine superphosphate)—

   Ellinbank.

2. *Phosphate Trials*—

   Leongatha, Larpent.

15. *Manurial Pilot Plots* —

   Callignee, Leongatha, Foster, Longwarry, Traralgon, Birregurra, Buckley, Deans Marsh, Bochara, Mortlake, Noorat, Penshurst, Port Fairy, Garvoc, Timboon.

B. Irrigated Pastures.—

4. *Experimental Plots* (manurial trials)—

   Tongala, Stanhope, Swan Hill, Cohuna.

2. *Experimental Plots* (salt reclamation)—

   Koroop, Tragowel.

* Mowing discontinued and trial thrown open to grazing in 1942.

Potato Eelworm

In view of the urgent need for a record potato crop in the coming season, it is essential for potato-growers to reduce as far as is possible, damage from potato eelworm. Eelworms, which, incidentally, are not related to earthworms, cause large nodular swellings in the surface of the tubers. Potatoes may become infected by growth of a crop on infested soil or by planting infected seed. Therefore, to control the disease, potatoes should be planted into uninfected soil and clean seed must be used. In addition to the use of clean seed, crop rotation is important as a means of reducing damage, as the practice of growing potatoes too frequently on the same area favours serious eelworm damage. Most varieties of oats, rye or wheat are suitable plants to include in the rotation, but pasture is not suitable, as the potato eelworm is able to attack many pasture species.

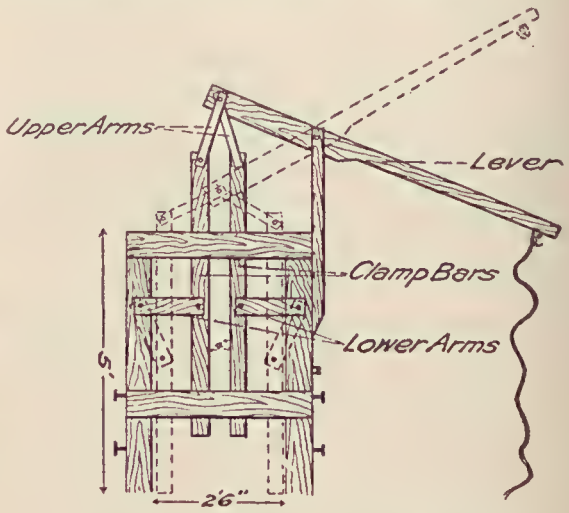
[Contributed by the Biological Branch.]

Dehorning of Cattle

By W. M. LEREW, G.M.V.C., Veterinary Officer

DEHORNING of cattle is a subject that during recent years has been attracting a steadily increasing amount of attention throughout all the principal cattle-raising countries of the world, not only from the point of view of the grazier and dairyman, but also from that of the large beef exporting firms. It is rather remarkable that it has not become a general practice throughout the world, as it has everything in its favour and, if properly carried out, nothing against it. It is well recognized that horns can be bred off cattle by using polled bulls, and in the case of beef cattle, breeders have the choice of four different breeds of hornless bulls, namely, Red Poll, Aberdeen Angus (Black Poll), Polled Hereford, and Polled Shorthorn. Using either of the first two naturally hornless bulls will give an extremely large proportion of hornless stock, and the few calves that are not entirely hornless will probably grow short stubs of horns which are generally loose instead of being firmly attached to the bony structure of the skull. These can be easily removed. In the case of Herefords and Shorthorns, pure-bred hornless specimens of each breed have been imported into Australia from America, and have been exhibited at Melbourne and Sydney shows, where they created a very favorable impression. These bulls, when mated with horned cows, have left over 70 per cent. of absolutely hornless stock in the first generation, illustrating the possibility of breeding the horns off Australian beef cattle.

A dehorning bail with head clamp closed, showing side gate. [U.S. Dept. Agric.

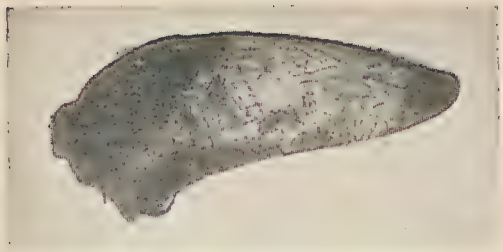


The front view of a dehorning bail.

[U.S. Dept. Agric.

The breeding of these pure-bred polled bulls has been achieved by careful selection, using hornless "sports" as a foundation to establish the strain, and as hornlessness is a dominant factor when attained in cattle the eventual hornless condition was arrived at in a reasonably short period. This may be proved by noting the number of generations through which the polled condition appears again, even when bred back with only horned cattle. To breed the horns off all cattle in this way would be ideal, but, owing to the small number of suitable bulls available at present, other methods have to be adopted. Among the recognized breeds of dairy cattle there is unfortunately only one hornless species, the Red Poll. This means that, in order to retain the valuable characteristics of the various breeds, and to avoid cross breeding, it will be necessary to remove the horns.

There are two different ways of removing horns; first, to stop the growth of horn in the young calf, and the second, to remove the horns from the full-grown beast. The first



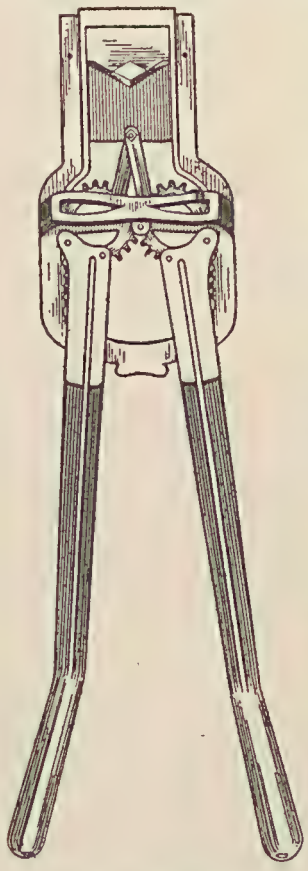
Showing horn after correct cutting.
Note hair and skin attached.
[U.S. Dept. Agric.

method, which prevents the horn from developing, is carried out on very young calves by means of the application of some caustic substance to the immature horn bud. The procedure is very simple and is carried out in the following manner. The calf should be treated when between the age of two and seven days, the hair being clipped off around the horn bud and a coating of vaseline applied to the surrounding skin to prevent injury from the caustic. Caustic potash, which is the preparation generally used, may be obtained in the form of rods or pencils from any chemist, and should be wrapped round with tough paper to protect the operator's fingers. The horn bud should be lightly rubbed with a piece of fine sandpaper till the surface becomes moist but not bleeding. Then rub the horn with the caustic, taking care that the whole surface has been treated. This should be repeated two or three times at intervals of a few minutes till blood appears in the centre of the horn. If done thoroughly the growth of horn will be prevented and the animal will suffer hardly any inconvenience. After applying the caustic take care that the calf is not exposed to rain for a day or two, as the caustic may run down the face and injure the skin. After using the caustic stick wipe any moisture off it and keep it in a well-corked, wide-mouthed bottle. Otherwise it will absorb moisture from the air and melt away. In cases of burning of the skin by caustic potash, immediately apply a weak solution of vinegar and water to the injured part.

The other method of dehorning entails the removal of the fully developed horns, and is preferably carried out when the animal is about two years old, but may be done at any later age. If removed before two years of age (except young calves done by the caustic method) the horns will not have finished growing and ugly stubs may result. It is advisable to cut in about a quarter of an inch below the skin on the horn, so that horn forming cells will be destroyed thus preventing any further growth. (See illustration.) The instruments generally used are either a sharp tenon saw or a cattle dehorner. The most convenient method of handling is to put the beast in a crush with a strong solid bail at the end, in which the head may be securely held. A pair of nose grips (bull holder) inserted into the nostrils and held by an assistant is a great help in keeping the head steady while the horns are being removed. A few quick strokes of the saw at the base of the horn is all that is required to remove it.

Cattle Dehorners

There are two types of cattle dehorners in common use, the first of which somewhat resembles a pair of secateurs with two concave blades. On closing the handles the blades, which overlap each other, are forced together through an ingenious arrangement of levers and rollers, and the horn is severed cleanly.



Dehorning clippers.
[U.S. Dept. Agric.

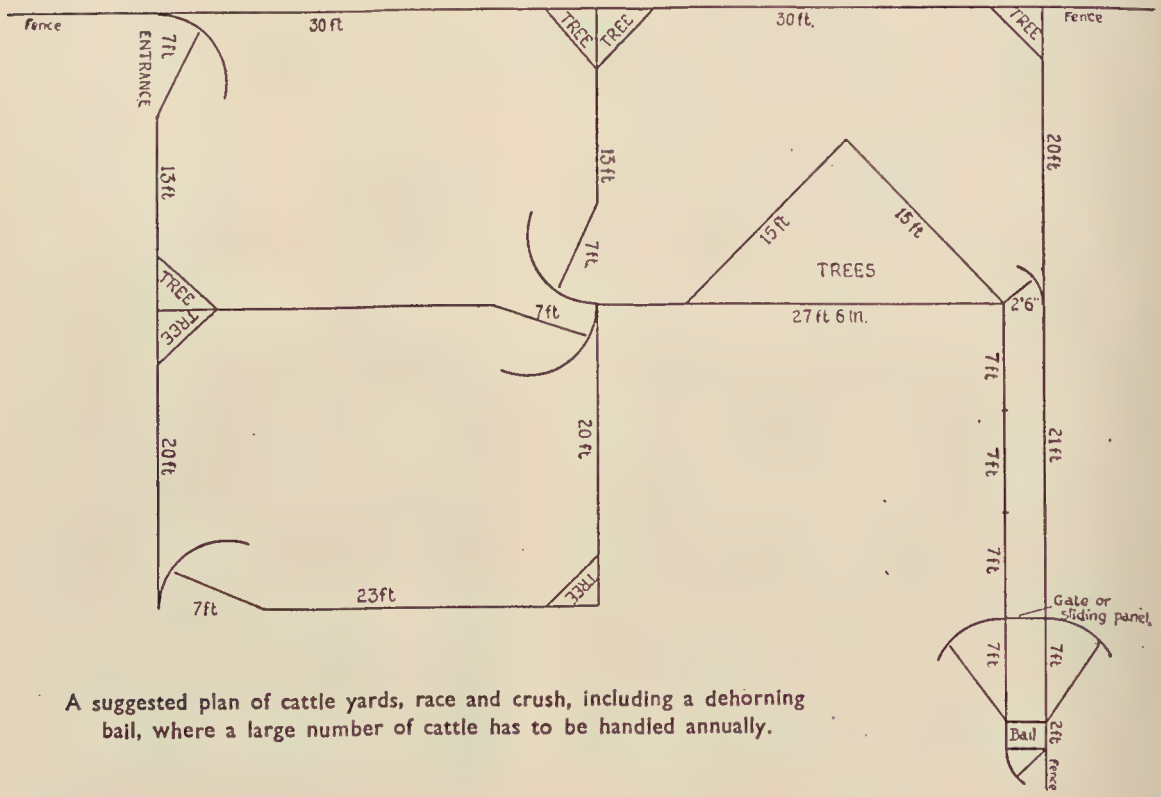
The second type of dehorner is constructed on the principle of the guillotine, and the blades, one of which is fixed, are in a frame. This is pushed down over the horn, and the necessary purchase is obtained by closing the handles, which operates a rack and pinion gear. The blades overlap when closed and the horn comes off quite evenly. After removal of the horns apply a dressing of dry antiseptic cotton wool. This will stop bleeding and keep out any infection. In a little while the skin will grow over the base of the horn, often without leaving any trace of the operation.

When using the dehorner care must

be exercised to ensure that an even pressure is maintained, as any uneven or jerky movement may cause the horn core to be pulled away from its attachment to the skull, leaving a large cavity which is difficult to keep clean and heal over. The dehorner should be thoroughly sterilized before using, and should also be dipped in some antiseptic solution after each horn is removed. The operation should be carried out in either the late autumn or early spring, when flies are not troublesome and mild weather prevails.

The principal advantages of dehorning may be briefly summarized as follow:—Removal of a source of danger to human beings and also to other animals. This means that skin wounds and torn udders would be reduced to a minimum. Nervous, timid cows can feed in safety. Smaller yards to hold the milking cows, as they will stand quietly and not interfere with each other. They also thrive better, as they do not disturb each other when feeding. Bullocks especially benefit, when being trucked long distances, as they cannot injure each other when in transit.

The only objection to removing the fully grown horns is the transient pain suffered during the few moments of the operation. If this small amount of pain is compared with the damage and suffering inflicted by a pair of horns during a beast's lifetime, every animal lover should at once become an ardent supporter of compulsory dehorning of all cattle.



A suggested plan of cattle yards, race and crush, including a dehorning bail, where a large number of cattle has to be handled annually.

Details are as follow:—Posts 10 ft. 6 in., sunk 3 ft. 6 in. in ground. To be strutted at gateways and corners. Rails 4 in. (or 6 in.) x 1½ in. hardwood. Removable rail in each gate at suitable height for handling animal. Double bail tongues adjustable for size of neck. Sharp edges of rails on crush gates to be planed. Front end gate of crush to be close boarded, all rails to be bolted on inside of posts and countersunk. Posts in race 7 ft. apart. All fences 7 ft. high with cap rail. Cap rails across race and crush to prevent spreading. Heavy bolts on all gates both top and bottom of crush. Centre yard gates to swing either way. Gates 6 ft. high, cap rail over gateway. Five rails in each gate (1 ft. apart for 4-in. rails). Five rails and cap in fences (1 ft. apart).

LIVER FLUKE DISEASE

By W. D. SHEW, G.M.V.C., B.V.Sc., Senior Veterinary Officer

A typical snail-infested stream. After broadcasting copper sulphate at the rate of 20 lb. per acre no live fluke snails could be found in this stream.

[After Clunies, Ross and McKay.

LIVER Fluke Disease is one of the most serious diseases of sheep in Australia. In addition to the actual mortality from the disease, the great deterioration in wool and mutton value of those animals which survive attacks must be taken into consideration. Further, it is now known that an invasion of young flukes renders sheep susceptible to the disease known as *Infectious necrotic hepatitis,* or Black Disease. It is found, also, that fluke-infested sheep are more susceptible to infection with other parasites, such as stomach, intestinal and lung worms. In view of all this, it is not surprising that once a property is looked upon as "flukey," its value deteriorates considerably, and sheep from such a run are not sought after by buyers so eagerly as are those from clean country. In addition to sheep, cattle also are liable to infestation by Liver Fluke.

Distribution and Economic Importance

In Australia, liver fluke invasion is most prevalent in irrigation areas and in those districts having a comparatively heavy rainfall, such as high undulating tablelands, lake districts and flat coastal country. Severe annual losses are reported from New South Wales, South Australia, Tasmania, and Victoria.

In Victoria, it has been found that the North-Eastern and Goulburn Valley districts and a portion of the North-West are especially prone to this disease. It is also fairly prevalent in certain parts of Gippsland and the Western District. In the other States, also, there are certain areas where losses are particularly severe.

As the disease can be prevented, and even when present can be eradicated, it is a lamentable fact that it should still be permitted to exact such a toll from our stock-owners.

The Life Cycle

Liver Fluke Disease is caused by a flat, leaf-like, somewhat oval worm, known as the liver fluke (*Fasciola hepatica*), which is found in the bile ducts and liver substance of sheep and also of cattle. It is yellowish or grey-green in colour and is about 1 inch long by ½ inch wide (Fig. 1).

It is essential that stock-owners should understand the life history of this parasite in

order that they may appreciate how stock become infested, and the methods of treatment and prevention of liver fluke disease.

Fig. 1—Liver fluke (natural size).

Adult flukes are found in the bile ducts of the liver, and here they lay their eggs. Each fluke is capable of producing many thousands of minute brownish-yellow eggs. From the liver these eggs pass into the bowels and then, with the faeces, are deposited on the pastures. Fluke eggs will not hatch unless they soon come in contact with moisture, in which case they will hatch out in warm weather in about 11 days; but, under cooler conditions, they require a longer period. A minute fluke (Fig. 2) is formed within the egg, and its active movements gradually push up a small lid at the top of the egg, and hatching is completed by this microscopic fluke emerging. It is covered with fine hairs by means of which it swims about rapidly, but will live for a few hours only unless it comes in contact with a certain variety of small fresh water snail, which is essential to its further development. This snail will be described later. On finding this snail, the tiny fluke bores its way in, and undergoes development and multiplication. Some few months later, growth within the snail is completed, and for each tiny fluke which entered the snail, some hundred or more young ones may emerge. These young flukes, still microscopic in size, are heart-shaped, and have long tails (Fig. 3).

For a short time they swim about in water, and then attach themselves to weeds or blades of grass. Here they shed their tails and secrete a protective covering around their bodies. These encysted forms are now ready to infest sheep, which become infested by drinking water containing flukes, or by grazing on affected pastures.

In the sheep, the cyst-wall is dissolved by the digestive juices, the tiny fluke bores through the bowel-wall, and enters the abdominal cavity, i.e., outside the bowel-wall, where, in a few days, it increases in size, and when about one-eight of an inch in length, and resembling an adult fluke in shape, it bores its way into the liver through the liver substance, and, making its way to the bile ducts, completes its life history. It becomes mature in the bile ducts, and about two months later will lay thousands of eggs.

Symptoms

Two types of symptoms occur, the acute and the sub-acute.

If the young fluke are swallowed in large numbers, the injuries caused by their invasion set up a severe inflammation of the liver capsule, and death may occur within a very short period of the appearance of the first symptom. In the sub-acute type, affected sheep, if driven, will be noticed to be languid and easily fatigued. If examined, the membranes of eyes and mouth will be seen to be anaemic. Later their gait may become stiff; they will lose condition rather rapidly, and dropsical swellings may develop under jaws, chest, and along the abdomen. Death may take place within two or three months, or the animals may apparently recover, but even in these cases the interference with growth and loss of condition is very serious. The carcass of a sheep which has died from fluke disease will be emaciated, generally there will be fluid in the abdominal cavity, whilst the liver will be found to be much altered, the bile ducts thick and distended, and on opening

Fig. 2—Young fluke after entering snail. [After Ross and Gordon.

Fig. 3—Young fluke after emerging from the snail.

these, large numbers of fluke will be revealed. Fluke may live in the bile ducts for twelve months or more.

Treatment

Treatment of this disease proved unsatisfactory until 1926. In that year, R. F. Montgomerie, B.Sc., P.H.D., F.R.C.V.S., working in Wales, found that one dose of carbon tetrachloride was definitely effective in destroying

all adult flukes in an infested sheep. Carbon tetrachloride is a heavy colourless liquid with a characteristic odour, and is very volatile, that is, it will evaporate quickly. The cost of this drug is small, and it can be easily administered. For each sheep, the dose is one cubic centimetre, or about sixteen drops.

On rare occasions following the administration of carbon-tetrachloride considerable mortality has occurred in the drenched sheep. The reasons for this occasional toxicity are not completely understood, but it is thought by some to be associated with calcium deficiency. Other possible factors are the administration of the drug before sudden cold changes, or the moving of sheep to strange paddocks after drenching.

The affected sheep exhibit symptoms of acute abdominal pain, and deaths occur in from three to four days.

It should be remembered that deaths may occur after drenching due to faulty administration of the drug, which results in the dose reaching the lungs instead of the stomach.

When sheep are to be drenched with carbon-tetrachloride, the following precautions should be observed:—

1. Always drench sheep in a standing position. Do not hold the tongue, and do not force back the head.

2. It is advisable to dose a small number of the flock three or four days before the main body; especially should this precaution apply to ewes forward in lamb.

3. Discontinue all feeding of concentrates at least one week before dosing.

4. Drench early in the day, and do not change pastures suddenly before or after drenching. Always return sheep after drenching to the paddock they were in before drenching.

Fig. 4—Common fresh water snails
(Natural size.)

A.—Fluke Snails (*Limnea brazieri*). These may be distinguished by the fact that when placed face downwards on the palm of the hand with the point of the shell towards the observer the final coil of the shell curves to the right. Young fluke must undergo development within these snails, so that without them the fluke disease could not occur.

B.—Snails not known to be carriers of fluke. The final coil of the shell curves to the left.

5. Choose suitable weather.

6. Only use carbon-tetrachloride of a reliable brand known to be uncontaminated, fresh, and free from impurities.

There are two methods of administering the dose in regular use:—(1) The liquid method; (2) the capsule method.

If using the liquid method, one must first dilute the drug with liquid paraffin so as to make a larger bulk, which can be easily given through the mouth with a syringe. To prepare the mixture add 4 parts of liquid paraffin, an oily colourless liquid, to 1 part of carbon tetrachloride. The dose for an adult sheep is 5 c.cs. of this mixture. A special 5 c.c. syringe, with a metal nozzle, suitable for administering this dose, may be purchased. If desired, the mixture can be purchased ready for use.

Any druggist will supply the drug, the paraffin, and the syringe. One quart of carbon tetrachloride and 4 quarts of liquid paraffin will be sufficient to drench every 1,000 sheep. Only sufficient for immediate use should be prepared. While the mixture is being used, it must be kept securely corked, for the drug is so volatile that much of its strength may be lost by evaporation if exposed to the air.

The capsules are like small lozenges, and can be purchased from any chemist or drug store, filled ready for use. In some ways this method is to be preferred, as the dose does not have to be measured, and there is no loss by evaporation. However, there are certain drawbacks to capsules, for if they are crushed by the teeth, trouble may ensue. Further, it may happen that, in some cases, they may not be swallowed, and may drop from the mouth unseen by the operator. The capsules may be given by means of a small balling gun or tube which can be made out of a piece of hose about 10 inches long, with a diameter of half an inch; insert into this piece of wood or cane not quite the length of the tubes, so as not to injure the sheep's throat. A pair of tongs made out of fencing wire is used by some owners to drop the capsules at the back of the tongue.

Carbon tetrachloride can be purchased from any chemist, but at present quotations as to cost cannot be given, as the price is rising due to war conditions. A special 5 c.c. syringe for administering this medication is obtainable from chemists for about 25s.

The best time to dose the sheep is about the end of May, when the flukes have mostly reached their adult stage, and are in the bile

ducts. One dose should be effective; but with a view to removing flukes which, at the time of the first dose, had not reached the ducts, it is advisable to give a second dose some six weeks later, i.e., about the beginning of July.

Such treatment, properly carried out, will eradicate the adult fluke from infested sheep, but it will not clear up fluke-infested country. This can be done only if proper measures are systematically carried out. The first essential is the removal of the small conical fresh water snail already referred to. This snail has a small greenish-brown conical shell about a quarter of an inch long. When placed with the open end of the shell downwards, it will be noticed that the spiral or curl of the shell turns to the right (*Limnea brazieri*) (Fig. 4). This is the only snail that as yet is definitely known to be the carrier of fluke disease in Australia. By destroying it, we can definitely remove the menace of the disease, for the presence of the snail is essential for the completion of the life cycle of liver flukes.

It has been found that by the systematic use of copper sulphate (bluestone) the snail can be destroyed. This is best carried out by the regular broadcasting of fine crystalline bluestone mixed with four parts of fine sand.

Mix 25 lb. of bluestone with 100 lb. of fine sand, thus making 125 lb. of mixture, which is sufficient to thoroughly treat 1 acre of snail infested pasture. In actual use, one sprinkles the powder only around swampy areas, around the edges of pools, dams, &c., that is, wherever there is moisture, and consequently where snails are likely to congregate. The faintest trace of bluestone, even one part in a million, will destroy them. In addition to broadcasting this mixture, it is advisable to hang small bags of bluestone on sticks in all dams, ponds, streams, &c., to which sheep may have access.

The broadcasting should be carried out from October onwards, as the principal escape of young fluke from snails takes place from then till late in summer. It should be noted that this treatment will not injure sheep or any other animals in any way. One treatment with bluestone is not necessarily sufficient, as its efficiency is lost after about one week; therefore it is well to repeat the sprinklings from time to time.

The fluke snail has two egg hatchings annually, one in December and the other in July. The eggs are deposited in jelly-like masses about half an inch in length, each mass containing about 40 eggs. These egg masses are not affected by bluestone, consequently it is imperative that the snails should be destroyed before they lay their eggs; thus bluestone must be broadcast not later than November and June in each year.

Copper sulphate or bluestone costs approximately 40s. per cwt., and as the treatment of affected pastures is simple, and so inexpensive in proportion to the enormous amount of good that will ensue, all sheep-owners are urged to adopt these measures, and carry them out conscientiously.

Sheep-owners should make themselves familiar with the appearance of the fluke snail, and then cause a careful search to be made for them in shallow water around the edges of swamps and in small pools. All should join in a united effort to destroy the snails; by so doing hundreds of thousands of pounds will be saved annually by the sheep-owners of Australia.

To summarize, it is well to draw particular attention to the following essential points:—

Summary

(1) Fluke disease is caused by a leaf-like worm in the liver.

(2) Fluke eggs cannot hatch in the absence of moisture.

(3) The young fluke must have a particular snail available to carry on its existence.

(4) Sheep affected with adult fluke can be freed of fluke disease by the use of carbon tetrachloride.

(5) Fluke disease can be entirely removed from infested properties by draining all swampy areas, and by following this up with bluestone treatment of moist lands to destroy the snails.

It should be noted also that cattle are very frequently affected with the same fluke that is found in sheep, and deaths from acute fluke disease are quite common.

BOTS IN HORSES

W. D. SHEW, G.M.V.C., B.V.Sc., Senior Veterinary Officer

THE Bot Fly, or Horse Bee as it is often called, is known to cause considerable loss to horse-owners in most parts of the world. In North America, Great Britain, Europe, and Asia, as well as in Australia, serious efforts are being made to control the ravages of this pest.

Bots may cause injury, which in some cases results in the death of the horse, in one of the following ways:—(1) by the fly itself during the process of egg-laying annoying the horse while at pasture or at work; (2) in the larval stage by the withdrawal of nutriment both from the stomach and its contents; (3) by the actual obstruction of the passage of food from the stomach to the intestines, especially when the larvae are collected in numbers about the pylorus (the exit door to the stomach), (4) by injury and irritation to the mucous membrane lining the stomach, due to the penetration of the hooklets by which the larvae are attached; (5) by irritation, injury, and possible penetration of the intestines, rectum and anus, in the passage of the larvae from the horse.

If the stomach or intestinal walls are penetrated by the bots peritonitis is often set up, and this generally causes the death of the horse.

It should be remembered, however, that it is really comparatively seldom that bots actually cause the death of horses. Because a post-mortem indicates that bots are present, they must not necessarily be blamed for the animal's death, unless there is evidence of perforation of the stomach or intestinal wall with peritonitis, or unless they have caused a definite stoppage of the bowel.

The female bot fly (*Gastrophilus intestinalis*).

Varieties of Bot Fly.

There are three distinct species of horse bot recognized in Australia:—(1) The Common Bot or *Gastrophilus Intestinalis;* (2) the Throat Bot or *Gastrophilus Nasalis;* (3) the Red-tailed Bot (Nose Fly) or *Gastrophilus Haemorrhoidalis.*

1. The Common Bot (*G. Intestinalis*) is the most numerous and is also the largest of the three. The adult is about ½ to ¾ in. in length, has transparent wings with dark spots. The body is yellowish-brown and has dark bands of black spots. The number of eggs laid by the fly varies from 300 to 500. She may lay them anywhere about the horse's body, but generally she hovers round the forelegs, and then, making a sudden dart, deposits one or more eggs about the front legs, usually inside the knees. She repeats this process until all her eggs are safely cemented to hairs on the afflicted horse. The eggs of this species are pale yellow, and are cemented by their lower third to the horse's hairs.

They do not hatch out until they have been detached by the horse's licking or biting, and the larvae are taken into the stomach where they usually attach themselves to the white lining of the left sac or round about the duodenal orifice, or opening into the duodenum or small intestines. The exact nature of the food taken by the young bots in the stomach is not quite clear, but they live to a certain extent at the expense of the host. As the colour of many larvae, especially young ones, is reddish, they probably consume an amount of blood.

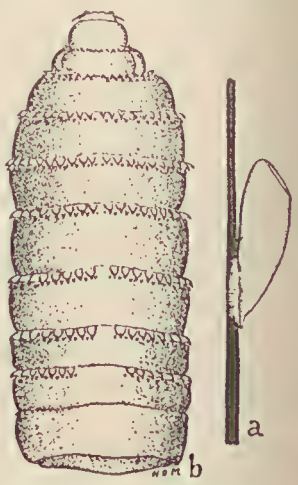
The larvae of the common bot and the throat bot exist in the stomach of the horse for many months—probably nine or ten—when they are expelled with the faeces. The larvae of the red-tailed bot re-attaches itself in the rectum and usually makes its own exit from the anus, and is not passed with the faeces.

On reaching the ground the bots burrow into loose earth, and in three or four days pupate. The pupal stage will vary according to moisture and temperature, but usually lasts from three to five weeks, after which the fly emerges. The lives of these flies are very short, probably from a few days up to three weeks—the average is about ten days. The fly does not take food, and the female concentrates on the laying of its eggs. Fertilization of the female probably takes place in the air during flight.

2. The Throat Bot (*G. Nasalis*). This is a smaller fly; it has clear transparent wings, and causes much more annoyance to the horse than does the common bot. It flies rapidly, poises in mid-air, and then dives down to lay its eggs under the throat and about the chin. Each egg is pale yellow, and is cemented to a hair along more than two-thirds of its length, whilst its free end diverges only slightly from the hair to which the egg is cemented.

How the eggs of this species of bot reach the stomach is not known. They hatch out without friction or moisture and probably they drop into the food or water, and so are swallowed and eventually attach themselves to the stomach wall or the duodenal wall (the first portion of the small intestine). Whereas the common bots mostly attach themselves to the covering of the left sac of the stomach (the white wall), the throat bot, if attached in the stomach, will be found at the pyloric or exit end of the stomach. It will also be noticed that the throat bot when fully grown in the stomach is paler in colour than the common bot.

3. The Red-tailed Bot (*Nose Fly—G. Haemorrhoidalis*). This is the smallest of the three species and is much darker in colour being almost black. It has clear transparent wings and a bright orange-red tip to its abdomen. Its eggs are black, and are laid one at a time on the fine hairs round the lips and nostrils. These eggs are laid as close to the edges of the lips as possible, where they can be moistened by saliva. The eggs nearest to the lips hatch out in about five days, are swallowed, and so proceed to the stomach, while those even an inch further away may take nearly three weeks to hatch, or may never hatch at all. It is the moisture and friction of the lips that hasten the hatching, and the young maggots may enter the mouth under their own power or may be swallowed in water or food. As mentioned before, there is a strong tendency for the bots of this species to let go their hold in the stomach or small intestine, pass back with the faeces and re-attach themselves in the rectum inside the anus. They remain here for a few days, accustoming themselves to the air. Then they drop off, and pass through the anus of their own volition, and are not passed with the faeces as is the case with the two first-mentioned species.



Gastrophilus intestinalis.
a—Egg on hair.
b—Larva (dorsal view).

Treatment.

One is often asked what is the best form of repellent to use to keep bot flies away from horses. No repellent has yet been found to be really successful, but various mixtures are used, e.g., creosote and lard, pine tar and lard, kerosene, lysol, or a 2 per cent. solution of creosote; these mixtures may be smeared over the hairs under the throat, neck, and on the legs, &c.

Protective devices such as fly-nets and cloths soaked in kerosene under the throat are certainly useful, but where horses are at pasture, sheds, or big trees providing heavy shade are probably of most value, as the bot fly does not enter heavy shade.

The best means of eradication of the larvae is to dose the affected horse. Treatment is as follows:—

Fast the horse for twelve hours, then ball him with a capsule containing carbon disulphide. The dose of this is 6 drams for a horse of about 1,000 pounds. This dosing may be varied by giving two doses of 4 drams each at two-hourly intervals or three doses of 3 drams each with one hour between doses. The single dose is probably best. No food or water should be given for at least four hours after treatment, and on no account should the dose be followed by a purgative; oil is especially dangerous.

It is *inadvisable* to give a purgative before dosing, and great care must be taken in balling

[*Continued on page 309*

Live Stock Notes

Compiled by
A. C. T. HEWITT, M.Agr.Sc.,
Live Stock Science Officer

Rearing Calves

HEAVY springing cows should be placed in clean, well-sheltered paddocks handy to the house, where they can be kept under observation for immediate attention in the event of calving or other troubles occurring.

The newly born calves should be left with their mothers until they are thoroughly dry and have had at least one feed. They should then be removed to their permanent quarters.

Calves may be reared on their mothers or foster mothers, or on the bucket. Vealers may be successfully reared on their mothers, but it is an extravagant method of raising good dairy calves, as one cow should provide sufficient milk for up to four calves.

When rearing calves on a foster mother it is desirable to remove the mother's own calf and foster up to four other calves on her. Her own calf may be fostered on another cow. Fostering should be done as soon after calving as possible before the mother has become too devoted to her own calf and before she has lost the desire to mother the calves, as a cow that has been milked for a short time will.

In England it is common for a cow to foster twelve calves during one lactation, the calves being fostered in three batches of four, each batch being kept on the foster mother for about three months, but in view of the different conditions obtaining in Victoria it is preferable to milk cows after they have reared the first batch of calves.

Much labour is saved if calves are reared on a foster mother, and if the cows are fed properly, the calves do much better than the average calf reared on the bucket.

Calves reared on the bucket must be well and carefully fed for the first few weeks until they can eat dry feed. An average-sized calf should be given 12 lb. of new milk (3.5 to 4 per cent. butterfat) daily in at least two feeds during the first two weeks of its life, after which some of the new milk may be substituted with skim milk or a gruel made by mixing 1 lb. of pollard, linseed meal, ground wheat, or a mixture of these foods, boiled in one gallon of water. More and more of the new milk may be displaced by skim milk or gruel as the calf grows, until by the sixth week little or no new milk is fed.

For best results it is advisable to feed at least 10 per cent. of skim milk with the gruel and have the calves running on good clean green pastures free from contamination of worm-infested cattle or other calves.

Age of Calf.	Quantity of New Milk to Feed Daily.	Quantity of Skim Milk or Gruel to Feed Daily.
1st week	Up to 12 lb.	..
2nd week	12 ,,	..
3rd week	9 ,,	5½ lb.
4th week	6 ,,	11 ,,
5th week	3 ,,	16½ ,,
6th to 24th week ..	..	22 ,,

Gruels made from the meals mentioned above should have one teaspoonful of lime and one of salt added to ensure good growth and a good appetite.

A calf starts to eat solid feed during its second week, and from then on it should be offered all of the good quality hay and pasturage it can eat.

National Security (Shearing of Sheep) Regulations

The Shearing Return.

A 1944 Shearing Return must be completed in detail for every flock shorn, such return to include the required information concerning every person operating in the shearing team.

To obviate any doubt as to responsibilities in this respect, the following procedure is to be adopted:—

(*a*) If a flock-owner arranges his own shearing team or engages a two-stand plant, the flock-owner must fill in the shearing return, and he will, of course, obtain from the operators of the two-stand plant all necessary information for inclusion in the return.

(*b*) In cases where flocks are shorn at a depot shed, the owner or operator of the depot shed must make out a separate shearing return for every flock shorn therein.

(*c*) In cases where the shearing is undertaken by a shearing contractor, who provides all or most of the labour, it will be the contractor's obligation to fill in the shearing return.

In all instances, shearing returns must be completed and forwarded to the Officer-in-Charge, Shearing Workers' Register, Room 353, T. and G. Building, Collins-street, Melbourne, within seven days of completion of the shearing of individual flocks.

Pig Breeding Stock

The accompanying picture of an English Large White boar taken from a Scottish paper indicates that pig breeders in the United Kingdom are maintaining a high standard in their stock.

Although there has been a forced reduction in the number of pigs in the United Kingdom during the war period, pig breeders there are as keen as ever to improve the quality of their stock. A buoyant trade in stud pigs is shown by reports of the numerous collective auction sales held in the United Kingdom during the last few years when pigs sold at very high prices.

In Australia, the Royal Shows were the "shop windows" where breeders of registered stud pigs exhibited the best specimens of their herds to the view of prospective buyers.

Large White boar, "Histon Eastern King."
[After *Scottish Farmer.*

Auction sales at the Royal Shows set values for stud pigs and disposed of numbers of pigs to breeders of porkers and baconers, and provided an exchange of animals between stud breeders. The advertisement derived from the shows and the contacts made between pig breeders led to private sales of pigs throughout the year. The Shows, therefore, were important to the improvement of the State's pig stock because they stimulated the desire to own better stock, and they also showed where good stock could be obtained.

There has not been a Royal Show in Melbourne for five years, but there

are still about 150 members of the Victorian branch of the Australian Stud Pig Breeders' Society endeavouring to maintain or improve the quality of the stud pigs they breed, and to supply selected stock to breeders of porkers and baconers.

Both sellers and buyers of breeding pigs are at a disadvantage through the loss of the Royal Shows. The average useful life of brood sows is about three years, and that of boars is little more, so that pig raisers must necessarily replace their breeding stock frequently. Unfortunately, when it is found that new breeding pigs must be purchased, many breeders do not know where to obtain good replacement stock, or they have not the necessary time to communicate with stud breeders because the replacement must be made quickly, especially in the case of a boar which has outlived his usefulness. For these reasons pig breeders frequently secure stock which are not as good as they require, but which are easily and quickly obtained.

Top price bacon pigs at the Melbourne Market.

Breeders of pigs registered in the herd book are situated in most districts of Victoria and are known to some pig raisers, and some of them advertise their stock in newspapers. The names and addresses of all these breeders may be obtained from the Secretary, Australian Stud Pig Breeders' Society (Victorian Branch), 328 Flinders-street, Melbourne.

Highly Priced Baconers.

The baconers above illustrated were bred and fattened by Mr. J. Cornell, Wheeler's Hill, and sold at the Western Metropolitan Market Trust's yards on the 15th June, 1944, making £7 18s. 6d. a head at auction, the highest price paid for baconers at that market up to that date. The photograph, which was taken on the farm two days before the sale, shows their long middles and good condition without excessive fatness. The estimated average carcass weight of the nine top pigs was 195 lb.

The baconers were sired by a registered Large White boar and were from Large White sows. They were reared in intensive pens and in paddocks, their diet consisting mainly of crushed wheat, milk, and green food. They were between seven and eight months old when marketed.

[L. A. Downey, H. D. A., Pig Expert.]

The White Leghorn Fowl

The origin of the domestic fowl has been a subject for discussion by biologists for many years. The opinion held by some authorities is that the red jungle fowl alone is the direct ancestor of all domestic fowls, while others are inclined to think that they have descended from one or more of the four known species of jungle fowls, or even from a species now extinct.

The sport of cockfighting no doubt exercised a tremendous influence in the subsequent distribution of the fowl, and later, with the suppression of cockfighting by law, poultry exhibitions gave impetus to the establishment of various breeds, and the greater use of poultry for egg and meat production.

A breed represents a group of fowls, such as the Leghorn, Minorca, Orpington, Wyandotte. A variety is a term used to indicate the variation that occurs within a breed. Therefore, White, Brown and other Leghorns are represented as varieties of the Leghorn breed. Other breeds have their respective varieties. There is an old saying that "shape makes the breed and colour the variety." Detailed descriptions of the different breeds and varieties of domestic poultry are contained in the "standards" published by specialists' clubs and breeders' organizations throughout the world.

There is no definite information as to the origin of the Leghorn fowl. Available records indicate that it came from Italy. White,

Brown and Black Leghorns were taken from the port of Leghorn in Italy, hence the name, and sent first to America and then to England and other countries. It is recorded that White Leghorns were first shown in Victoria in 1879.

The varieties of Leghorns include the White, Brown, Black, Buff, Cuckoo, Pile, Duckwing, and Blue. The White Leghorn is by far the most popular, and is kept in greater numbers than any other breed or variety of poultry.

During recent years commercial egg farming has done much to popularize the egg-laying varieties of fowls, and of all those used for this purpose the White Leghorn is the most popular, although the Australorp and Rhode Island Red have been developed to a large extent in this country. The White Leghorn is essentially an egg-producing variety which lays white eggs, and belongs to a group known as "light breeds." While not included amongst the table varieties of poultry, large numbers are sold and used for this purpose. No variety of fowl could have attained and maintained the popularity of the White Leghorn for over half a century unless it possessed qualities of a high order, not merely in one country, but throughout the entire world. It is well adapted to almost all kinds of climate or environment, and the records of laying tests in all countries have been testimony to its high egg production.

In keeping White Leghorns for egg production, great care in the selection of the breeding stock is necessary, if the resulting progeny are to be strong and lay a large number of eggs.

Under good conditions White Leghorn hens should lay an average of 15 to 16 dozen eggs each during their first laying year, and 10 to 12 dozen eggs each during their second and third laying years.

[H. F. Clinton, Poultry Expert.]

Bees

One of the most valuable eucalypts from a honey-producing point of view is the grey box, but the blooming cycle of this eucalypt is irregular, extending at times to three or four years. The main blooming period is March and April, with odd trees holding their bloom throughout the winter. Trees blooming during the late autumn and winter secrete nectar which becomes saturated with rain. This is gathered by the bees during fine weather, and stored in the hive, in combs which frequently are not covered by the colony during cold spells This unprotected honey, already with a high moisture content, will absorb further moisture from the atmosphere, causing a slight fermentation when the temperature rises in the early spring. Such honey when used as food by the bees causes a form of dysentry, often resulting in heavy mortality, losses sometimes exceeding 80 per cent. of the affected colonies. At a later stage this honey, although thin and watery in appearance, seems to lose its ill-effects on the bees, and from November onwards swarms may be safely given combs containing honey taken from the hives of affected colonies.

Climatic conditions appear to govern the percentage of mortality among affected colonies, localities with cold winter climates registering a high percentage, while in the warm northern areas losses are comparatively light, and affected colonies recover rapidly when placed within reach of a fresh pollen and nectar supply. Beekeepers who have located their bees in the vicinity of blooming grey-box timber during the past autumn are advised to adopt the following procedure as a precaution against possible loss:—

Remove bees from the area as soon as possible; remove all honey from supers, also from brood chamber, if not covered by bees. If short of stores in early spring, feed sugar syrup in preference to the grey box honey removed from the hives.

[J. W. Thomlinson and W. A. Collins, Apiary Inspectors.]

VETERINARY NOTES

Stable Injuries of Horses

Injuries produced in the stable may be caused by quite a number of conditions, most of which can be controlled. Let us consider first injuries caused by the horse lying down. Amongst horses stabled at night (even when plenty of bedding is supplied) there are always some that disarrange the bedding with the result that they are lying mainly on the bare floor of the stable. The parts most subject to injury through this cause are the elbows and outsides of the hocks.

The elbow is particularly liable to damage, and the condition known as "capped elbow" may be caused by the point of the elbow coming in contact with the ground or with the heel of a shoe when lying down. With horses that make a habit of disarranging their bedding it is a good plan to bed down with sawdust under the straw.

Kicking comes next on the list. Kicking may be a vice or merely play. In any case it is destructive to stables and a danger to other horses and man.

Kicking may be controlled to a great extent by always allowing horses to occupy the same position in the stable. Some horses kick only when feeding, especially when interfered with by the next animal. This does not happen where there are proper stall partitions.

There are some sour-tempered horses that seldom agree with the others. Naturally, such horses must be kept apart. When rails are used between stalls they should be low enough to prevent a horse kicking underneath and striking the animal in the next stall; further by kicking over the rail the horse may also injure itself.

"Poll-evil" may be caused by a horse knocking the top of its head when going through a low door. When taking a horse through a low doorway always give him a perfectly free head, and do not on any account try to pull the head down.

Doors should be wide enough to allow horses to pass through without danger of causing injury to the hip or pelvis. A horse injured in this way never forgets it and will nearly always want to rush through a door as quickly as possible, very often injuring itself again.

Saddle and harness brackets should be fitted high enough to prevent animals from injuring their faces or eyes. Projecting nails are often the cause of torn nostrils or eyelids. If there is a nail anywhere within reach a horse is almost sure to come in contact with it.

Slipping is a frequent cause of injury. Usually, when being turned round in the stall the hind legs go from under the animal, and it may fall heavily on its pelvis which is liable to be broken.

A horse cast in a box is invariably close to the wall with its knees bent. With the assistance of a rope, the animal should be rolled over or else the body pulled away from the wall until the front legs can be extended. In both cases the horse is then able to rise without trouble.

Sometimes a horse, usually a bully or perhaps a "rig," will bite the animal in an adjoining stall and may cause considerable damage to the neck and ears. Removal of the offender is the obvious remedy.

Injuries due to a horse hanging back in the stable when tied up are not uncommon. This is a habit acquired by shy nervous horses and is persistent when once established. If the rope does not break the horse almost invariably comes down on the point of the hocks and scrapes them raw. Once this trick is acquired the animal should be kept in a box and never tied up.

[S. A. Mountjoy, L.V.Sc., Veterinary Officer.]

BOTS IN HORSES—*continued from page 304.*

the horse, as should the capsule break in his mouth and the drug get into the lungs, he may die. Young and small animals should receive proportionately small doses. Old and debilitated horses should be looked upon as risky cases for treatment.

Bot larvae may be passed for two or three weeks after treatment, and individual horses have been known to pass over 500 larvae, whilst in post-mortems in extreme cases over 1,000 larvae have been recorded as being present in the abdominal contents.

Preparation of Poultry for the Table

By MARTIN D. HALL,
Assistant Poultry Expert

IN the selection of poultry for cooking purposes, there are two main classes which the housewife should know, namely, a young bird which is termed a roasting fowl, and an older bird suitable only for boiling.

In a young bird the bone structure is of a soft nature, and therefore the end of the breast-bone will be found to be soft and pliable. As the bird increases in age the bone structure hardens. This is the usual and the most reliable method of determining the difference between the two classes referred to, whether the bird is alive or dressed. In addition, the shanks and feet of a young bird are smooth and pliable, the feathers fine and soft, the skin supple and fine in texture, the bird's entire appearance having certain qualities belonging to early stages of growth.

Most of the differences between the flavour of different breeds are undoubtedly due to the methods of feeding, preparation, and marketing rather than to breed distinction. Palatability and quality of the flesh are the most practical and important considerations, and colour of flesh, legs and feathers are considerations of prejudice. A plump-breasted table bird of good quality will naturally have a better flavour than would a poor bird.

Fasting Before Killing

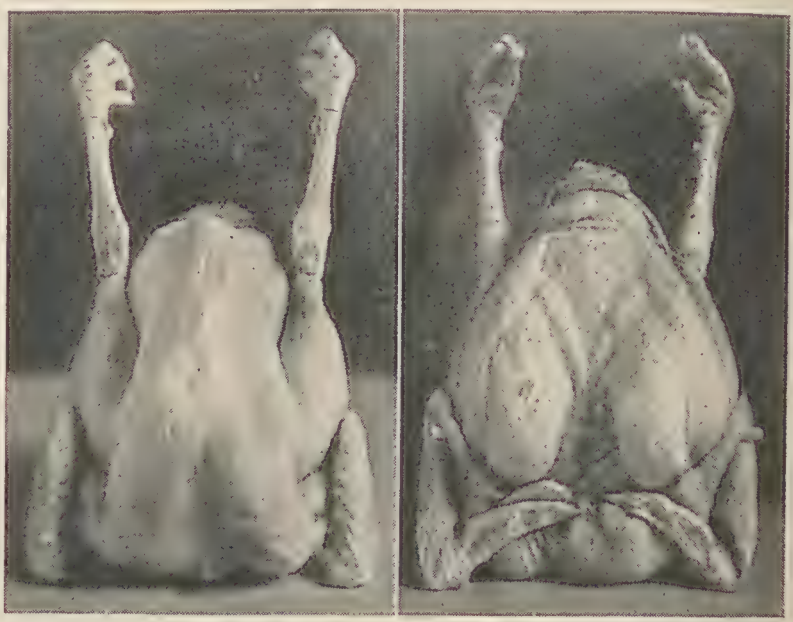
The bird should not be fed for about 24 hours before killing, but a regular supply of clean, cool drinking water should always be available. This starving for a while allows the crop and intestines to become emptied of food, and the bird will therefore keep much longer before cooking.

Dressing

After plucking, provided the weather is suitable, the bird should be kept hanging head down, in a cool place for about twelve hours before dressing. See that the legs and feet are thoroughly clean. The toes can be chopped off, or preferably the sinews may be drawn.

Drawing the Sinews.—First, make an incision across the front of the shank about midway between the foot and the hock. Snap the bone at the part where the incision is made, but do not cut off. Twist the lower part of the shank around a few times, causing the bone to protrude through the skin. A piece of rope or wire formed into a loop and fastened to a post or wall is necessary to extract the sinews. Place the lower part of the shank and foot in the loop, grasp the leg firmly around the hock, and give a strong downward pull and the sinews will come away. Chop off the ends of shanks neatly.

To Draw.—Cut off the head at the top of the neck. Slit the skin at the back of the neck down to the shoulder. Separate the skin from the neck and cut the neck off about one inch from the base. Remove the windpipe and crop from the neck end. Cut down each



Front and back view of a prime chicken correctly skewer-dressed for roasting.

Another view of a correctly trussed chicken.

Stuffing for Roast Fowl

Veal Forcemeat.—Eight tablespoons breadcrumbs, 2 teaspoons chopped parsley, pinch of mixed herbs, 1 teaspoon butter or chopped suet, pepper, grated lemon rind, grated nutmeg, 2 tablespoons milk.

Method.—Mix all dry ingredients, rub in butter with spoon, and milk sufficient to moisten.

side of the neck to the shoulder bones and insert the finger well into the breast cavity, loosening all ligaments attached to the internal organs to the body. Reverse the bird and make an incision betwen the tail and vent. Insert the finger and detach all ligaments and connective tissue, particularly the layer of fat connected to the gizzard near the point of the breast. If this loosening method is correctly applied the internal organs should come away quite easily.

To Truss for Roasting.—Pass the skewer through the skin at the elbow joint. There is a strong sinew running along the outer extremity of the wing, and it is necessary that the skewer be placed between this sinew and the bone. This fastens the skewer firmly to the wing. Force the leg up so that it projects beyond the back of the bird, and pass the skewer through the flesh under the leg joint. Pass the skewer across the back of the bird and fasten the other leg and wing in a similar manner. Chop off any excess skewer remaining after the bird is trussed. To tie the legs down, place the bird on its back with breast towards you. Place the string under the back near the tail, then bring each end of the string up against the body, over the fleshy part of the legs near the hocks and around to the back where it should be securely fastened. The legs may be straightened by making a small incision across each leg near the hock. Finally, turn the ends of the wings back behind the shoulders, thus holding the skin of the neck in position.

Giblets consist of gizzard, liver, heart and neck, and can be used for the making of soup. The food-sac can be removed by making an incision at the upper end of the gizzard, care being taken not to cut the sac. Force the gizzard inside out and the sac will come away.

Method of Roasting Fowl

Bard (cover the breast with fat bacon).

Wrap in greased paper.

Place on trivet in baking dish with 2 to 3 tablespoons of fat.

Put into a hot oven; reduce heat after 10 minutes.

Baste every 15 minutes (over the paper).

Remove paper and bacon one quarter to half an hour (according to size of bird) before lifting, to allow for browning.

Garnish with rolls of grilled bacon, potato olives and watercress.

Serve with brown gravy, bread sauce, boiled ham or pickled pork, and French salad.

Time to Roast.—1-2 hours, according to size.

Carving and Serving Roast Fowl

Place on table with neck of bird towards left hand of carver, the bird lying on its back.

Insert fork firmly through breastbone, near the wishbone.

Cut skin around thigh joint; bend back thigh with knife, then separate at the joint; cut leg from thigh to joint.

Remove wing in same way. Repeat on other side.

Cut thin slices from each side of breast.

Cut through skin below end of breastbone so that an opening is made from which to serve the stuffing.

IN THE ORCHARD

Contributed by the Horticultural Division

Green Peach Aphis

ONE of the most necessary sprays which a peach grower uses on his trees is the winter spray for the control of green peach aphis. During the winter the eggs of the aphis are laid on buds or lateral growths by insects which fly to the tree from herbage growing in the orchard. The egg stage of the insect is vulnerable to sprays such as tar distillate, used at a strength of 1 in 35, or oil sprays containing D.N.C. used at a strength of 1 in 39. As eggs are laid up to the middle of June, the best time to spray the trees is during early to mid-July. Later sprays may damage the buds of the peach trees.

The result of omitting a spray of tar distillate. Unsprayed aphis-infested trees on left. Sprayed clean trees on right.

Tar distillate is an unpleasant spray to use because of the burning effect on the face and hands of the sprayer. This disability may be overcome by smearing the face and hands with lanoline or paraffin jelly. The same precaution should also be taken prior to using D.N.C. sprays, in order to counteract the yellow staining characteristic of this spray, which is otherwise quite harmless in its effect on the skin.

Codling Moth

Magpies and other birds perform a useful service to apple and pear growers during the winter months by destroying codling moth grubs secreted in cracks and under loose bark at the bases of trees, but growers should not rely entirely on the activity of birds for the destruction of grubs in these locations. By thoroughly scraping the butts and branches of trees and filling in cracks with putty or cement, the grubs will be denied secure places for pupation, and thus the use of hessian or chemical bandages during the summer will be more efficient. In addition, in the process of cleaning up the trees, large numbers of grubs are exposed and destroyed. This practice is essential, particularly where trees are rather old and rough barked. If insufficient labour is available to cover the whole orchard in this way every year, the job should be done at least once in every three years.

Codling moth grubs under a piece of bark from an apple tree.

Woolly Aphis

Woolly aphis on apple trees is another pest which needs to be sprayed in winter if it is to be effectively controlled. Normally this insect is kept under control by the parasitic wasp, but in some seasons, particularly in the cooler districts, the wasps are not sufficiently active to reduce the numbers of aphis. It was noticeable this season that aphis colonies were fairly numerous on some orchards during the autumn. For control, a spray of red oil, strength 1 gallon in 15 of water, should be applied during July or August. Because of the waxy covering surrounding the aphis, a high pressure spray is required in order to penetrate the colonies. This spray does not reduce the wasp population, because larvae are protected within the bodies of the aphis.

Wood-rotting Fungi

Fruit trees are subject to the ever present menace of attack by the various wood-rotting

fungi frequently found in orchards. The commonest cause of damage is *Polystictus versicolor*, a form which causes the death of wood on which the bark becomes loose and papery. Other varieties have different symptoms, but the result of the attack is seen in the decline in vigour of the affected limb, which is usually followed by its death. If the disease extends to the main stem, the whole tree usually is affected and dies.

For control of such diseases, preventative measures are all important:—

1. Remove all visible sources of infection by grubbing out severely infected trees. Cut out affected limbs at least one foot below the source of infection, and burn all infected wood.

2. As far as possible, avoid damage to trees during ploughing or other cultural operations.

3. As the fungi gain entrance through large wounds or pruning cuts, these should be painted over with either a bitumen or white lead paint. Cuts should be inspected again after treatment and should be repainted if there is any sign of cracking of the surface.

A peach tree severely infected with *Polystictus*.

Collection of Grafting Wood

If the re-working of fruit trees is contemplated in the spring, scions of the required varieties should be collected now. Strong-growing laterals from trees known to produce good quality fruit should be selected and heeled in at the base of the tree.

The Use of Lime in the Orchard

Poor winter weed growth is usually indicative of some unsatisfactory soil condition. Perhaps it is due to insufficient fertilizers or very wet soil. On the other hand, orchard soils which do not produce a satisfactory growth of green crop or natural herbage during the winter may benefit from an application of lime. It is known that lime improves the growth of leguminous crops and if a green manure crop of peas, tick beans, or lupins is grown, a greater quantity of greenstuff will be obtained where lime has been applied. Most of our orchard soils, except those along the Murray Valley, are acidic, and liming reduces acidity. In addition, where a soil is sticky and difficult to plough and cultivate, a heavy lime dressing will improve its physical condition. Up to two tons per acre of ground limestone may be applied. A dressing every five years should be sufficient.

IN THE GARDEN

By J. L. PROVAN, B.Agr.Sc., Principal, School of Horticulture, Burnley Gardens

Violets

THE violet is one of our garden plants which is not usually given enough attention. It is often planted in a border and allowed to grow more or less unattended. Certainly it is watered and the flowers picked, and sometimes it may even be sprayed when the red spider becomes numerous.

To obtain the best results from the culture of violets it is advisable to give them a sunny position, particularly if early flowers are required, and to plant them in a slightly acid soil which is cool and fairly retentive of moisture. Soils which are neutral or alkaline may be made slightly acid by digging in large quantities of well-decayed manure or compost,

together with small applications of sulphate of iron or aluminium sulphate, or flowers of sulphur.

In preparing the soil do not add heavy applications of nitrogenous manure such as sulphate of ammonia, nitrate of soda or blood manure. This form of manuring should be very light, otherwise luxuriant foliage will result and the flowering will be correspondingly reduced. The plants should be lifted, the soil dug over, more organic matter added and new plants put in every second year.

Propagation can be achieved by seed, offsets, or runners as they are often called, cuttings, or by the division of the old crowns. The offsets are planted and the division of the crowns is carried out directly after the plants have flowered. In dividing up the mature crowns, the old woody portions should be discarded and the young well-rooted crowns should be retained for planting. The usual distance for planting is 12 inches apart each way. In summer it is advisable to remove all the runners which are produced from the planted crowns, as they interfere with cultivation.

If it is desired to retain two or three runners per plant, then wider spacing than that mentioned above is necessary. Do not let the plants become too dry during the summer. Frequent sprinklings with water will check the development of red spider, which finds the violet a very attractive host plant. When attacked by this mite the leaves become yellow or paper coloured. In the early stages they show a mottling, due to the spider feeding on the under-surface of leaves.

Varieties.

Many varieties of violets have been developed from the original *Viola odorata,* which is the name of the Sweet Violet, a native of the British Isles. Violets may be single or double and they vary in colour from white to a reddish purple. One of the finest single varieties in cultivation is *Princess of Wales,* which has large violet-coloured blooms carried on stalks 6 inches or more in length and standing erect. It has a sweet perfume and a vigorous habit of growth.

La France is another large-flowered single violet with round petals and a metallic blue colour, the stems are stiff and long.

Princess Mary has beautiful semi-double flowers of a rich violet-blue shade. It is a strong growing variety.

Mrs. D. Lloyd George is a large-flowered variety with stems measuring 9 inches in length, the colour a rich violet blue. The petals are broad, and in the centre of each flower, which is white tinted red, there is a small rosette.

Marie Louise is one of the most popular of the double-flowering varieties, and it has large lavender-blue flowers with white eyes. It is noted for its perfume.

Lady Hume Campbell is another fine double variety, similar in colour to Marie Louise. It is a hardy variety which does not suffer much in our hot climate.

Neapolitan has a double lavender-blue flower with a white centre.

The *Parma* violet is very similar to Neapolitan, but flowers a little earlier and is noted for its sweet perfume.

A good single white violet is *White Czar,* which is somewhat variable, while the best double white is *Compte de Brazza.*

The so-called "red" violet is *Admiral Avellan,* which is a reddish purple in colour and rather dwarf-growing and free flowering. *Perle Rose* is a rose-coloured violet with a white centre. It has medium-sized flowers.

THE VEGETABLE GARDEN

Cabbage

Plants of *Early Flat Parisian* and *Full Irish* cabbages may be set out in their permanent beds this month and early next month. Space the rows about 30 inches apart and allow at least 2 ft. between the plants. The first of these varieties, *Parisian,* is a flat drumhead type of cabbage which grows very well in the spring and matures during November. It forms a very solid medium-sized head. *Full Irish,* on the other hand, is an early Jersey Wakefield type with a rather loose, conical-shaped head.

Lettuce

A good spring lettuce for planting out this month is *Imperial* 615. Rows should be spaced about 15 inches apart and 12 inches between each plant in the row. For successful lettuce growing it is essential to have well prepared beds. At this time of the year raise the surface of the beds well above the surrounding paths. Beds 6 or 8 inches high will give better results than flat beds which become wet in the winter and early spring. When making up a

[Continued on page 329.

BOOK-KEEPING for the FARMER

By RALPH F. DUNN, A.F.I.A.

IN the following article it is not intended to submit a complicated system of bookkeeping, requiring much clerical labour and perhaps beyond the capacity of persons not trained in that class of work, but rather to set out the main principles of bookkeeping so that the farmer may keep records of all his transactions for future guidance.

It is thought that the article might also prove useful to leaders and members of Young Farmers' Clubs. Many of these young people will one day have farms of their own, or will be assisting their parents in the running of the family property. A knowledge of bookkeeping gained during their school days will then be of great practical advantage to their parents and to themselves.

Any system of bookkeeping may be developed to provide quite detailed information, but where a farmer has not previously kept books it is unwise to commence with a system of great detail. In his case, better results would be obtained with a simple system, properly kept, by which the year's operations as a whole may be reviewed.

No system of bookkeeping can be successfully operated unless sufficient time is allotted to carry out the duties involved. By setting aside a portion of each evening or perhaps one evening each week, to make the necessary entries in the books, the work is not permitted to fall into arrears, a situation fraught with danger insofar as bookkeeping is concerned. Clerical assistance is generally not available, and indeed, in most cases, is quite unnecessary.

GENERAL

Farming operations fall into several categories—wheat growing, sheep raising, fruit growing, and mixed farming are examples. Perhaps a system applicable to the mixed farm would best serve to explain the principles of bookkeeping which could be adopted by the primary producer who desires to maintain an accurate record of his farming operations and financial position.

Many advantages accrue from this knowledge. Among other things they include readily accessible information regarding:—

> The amount of capital invested; value of assets employed in farming operations; cash position; value of sundry debtors; amounts due to creditors; cost of operations, and profits or losses.

From this information future operations can be planned, losses can be traced to their source, and undue or excessive costs located and controlled. The results of the year's work are brought under review and can be compared with those of previous years.

Books Required

The books required to record financial transactions are set out hereunder:—

Bank pay-in book and Cheque book
Receipt book,
Cash book,
Sales book (sometimes called Day book),
Purchases book (sometimes called Invoice book),
Journal,
Ledger,
Diary,

and, where necessary, a Petty Cash book.

It is advisable to purchase books of good quality as they will be in use for a number of years.

Adequate provision should be made to file separately, invoices, paid accounts, account sales, and receipts. An old-fashioned style of filing everything on one spike file will inevitably result in confusion. A little thought given to this matter, and a system evolved of clipping these memoranda in separate files, readily accessible, will be well repaid. Lack of method causes many errors, loss of time and added labour.

The books should be readily accessible, always in their place and safely stored. If necessary, as on a large farm or station, an office should be made available on the premises. If circumstances do not warrant this expenditure, other satisfactory provision should be made. This should not be overlooked; it is important.

The Pay-in Book and Cheque Book do not require a lengthy introduction. The former is supplied by the bank of which the farmer is a customer, and is used to record payments into the bank account and for obtaining receipts therefor. The cheque book is well known as a medium for the payment of accounts.

The Receipt Book also is well known. A receipt must be issued for each payment received. Receipt books differ in construction and design. The carbon duplicate type is the one most favoured by persons skilled in bookkeeping, and is recommended because it permits an exact duplicate of each receipt issued to be kept for future reference, and as a document of first entry on which to build up the cash book.

The Books of Record

A knowledge of the actual books of record is necessary, and with that object in view a study of the following descriptions will be of value.

As the system of keeping accounts is unfolded and the principles on which bookkeeping is founded are developed, the terms "debit" and "credit" will appear many times. An explanation at this stage, therefore, is advisable. The term "debit" (abbreviated, "Dr.") is an entry made on the *left-hand side* of a ledger account and denotes that the account concerned has *received* the value indicated. It also indicates an *asset*, a *loss* or *an expense*. A credit (abbreviated, "Cr.") is an entry made on the *right-hand* side of a ledger account, and denotes that that account *has given* the value indicated. It also indicates a *liability*, a *gain* or *profit*.

The Cash Book.

The cash book is a complete record of all transactions which involve cash. It will show, at any given time, the cash balance available at the bank, or the amount by which the account is overdrawn.

The debit (left-hand) side of the cash book is a record of moneys received and paid into the bank account. It is written up daily or at other intervals as indicated by experience from the carbon duplicate remaining in the receipt book.

The credit (right-hand) side, is a record of moneys paid out and is written up from the cheque book butt.

It also constitutes the *cash account*, and is therefore actually part of the ledger, as no account of this nature appears therein. This account, when opened, is debited with cash at

Specimen of Cash Book.

Dr. **CASH BOOK.** *Cr.*

Date.	Name.	Receipt No.	Folio.	£	s.	d.	£	s.	d.	Date.	Name and Particulars.	Cheque No.	Folio.	£	s.	d.

SALES BOOK.

Date.	Name.	Particulars.	Ledger Folio.	Crops.			Cattle.			Sheep.			Wool.			Misc.		
				£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.

the bank at that time, or if such is the case, credited with the amount of overdraft. The balance therefore will represent, at any time, the position of the bank account—information which is of great value.

In ascertaining the amount of debit or credit in accordance with the foregoing, due allowance should be made for unpresented cheques.

In order to obviate wastage and loss of control over cash transactions it is necessary that *all receipts* be paid into the bank. The time of payment into the bank is not vital, but it is imperative that all receipts be paid in without deduction, and with a minimum of delay. Further, *all payments* should be made by cheque. Small payments are made through a *petty cash* account.

It may be thought that this is not practicable in respect to farming operations, but this is not so. It can and should be done. It is the practice in operation at the various State farms. It has been tried and proved, and is strongly recommended.

Sales Book.

The sales book is a book of original entry and is used to record sales of all produce, not sold for cash (i.e., credit sales).

Upon a sale of produce being effected, and the goods forwarded to the buyer (provided, of course, that the sale is of a credit nature), it is customary to prepare an invoice setting out the details of the sale and amount due in payment. This is prepared in duplicate, the original being forwarded to the buyer when the goods are despatched. It is from the duplicate invoices that the entries in the sales book are made. The duplicate invoices should be filed for future reference.

Frequently goods are consigned to agents for *sale at auction,* and until the "account sales" is received, together with payment from the agent, the value of the sale is not known. For simplicity it is advisable to disregard such sales, insofar as the financial books are concerned, until receipt of the "account sales." The necessary entries can then be made in the sales book. Such sales, however, are not disregarded *completely* until payment is received. A record is made in a diary which is kept, among other things, for this purpose.

Purchases Book.

The purchases book records *purchases,* and, as in the case of the sales book, only credit transactions are entered.

Upon receipt of an invoice for goods purchased, the necessary detail is transcribed into the purchases book, the value of the produce being entered into the appropriate column according to the class of goods purchased.

It will be found, when setting up both sales and purchases books, that the ruling contained in an ordinary journal can be adapted to suit requirements. It may be necessary to use a double page in order to obtain sufficient money columns, *which should be ruled as desired.*

Where goods are sold for cash (i.e., payment received on delivery), a receipt is issued

PURCHASES BOOK.

Date.	Name.	Particulars.	Ledger Folio.	Manure.			Seed.			Fodder.			Sheep.			Cattle.			Misc.			Household.		
				£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.

JOURNAL.

Date.	Particulars.	Ledger Folio.	Dr. £	Dr. s.	Dr. d.	Cr. £	Cr. s.	Cr. d.
1944 Jan. 1	Plant and Machinery Account Dr.	L. 16	16					
	To A. Jones Account Cr.	L. 5				16		
	being purchase of new feed cutter							

in conformity with the procedure already outlined. In due course the duplicate receipt is copied into the debit side of the cash book. This entry constitutes the record of a *cash sale* which corresponds with that for a *credit sale* in the day book. Likewise, when goods are purchased on a cash basis, the resulting entry on the credit side of the cash book corresponds with the entry in the purchases book which is made upon a credit purchase being effected.

Some purchases are of articles of a *capital* nature, as distinct from those in the ordinary course of farm trading operations. Sales of this nature also occur. These transactions are not recorded in the *purchases or sales books,* but are entered direct into the journal.

The Journal.

Transactions of a capital nature, entries necessary to prepare a "Profit and Loss Account" and various adjustments cannot be allocated to the purchases or sales books. They are made in the journal. The rule relating to journal entries is always:—

Debit the Receiver.
Credit the Giver.
Debit losses.
Credit Gains.

Example: Jan. 1st, 1944. Bought from A. Jones—one new feed cutter—£16 (as set out above).

The Ledger.

The sales and purchases books and the journal are books of original entry, and as such constitute a record of transactions, but do not present a summary of them.

The ledger furnishes this summary.

Where accounts are not numerous, the bound ledger is most effective. It is provided with an index, which renders identification of the particular account required a matter of seconds. Also, it has the advantage that being bound, loss of material is practically impossible. In some circumstances, however, the

LEDGER.

Dr. A. Jones Account. *Cr.*

Date.	Particulars.	Folio.	£	s.	d.	Date.	Particulars.	Folio.	£	s.	d.
						1944 Jan. 1	By Machinery and Plant Account	J. 1	16		

Dr. Machinery and Plant Account. *Cr.*

Date.	Particulars.	Folio.	£	s.	d.	Date.	Particulars.	Folio.	£	s.	d.
1944 Jan. 1	To A. Jones Account	J. 1	16								

use of this type of ledger is impracticable. If accounts are numerous it may be necessary to use either the card or loose-leaf systems.

The method of operation of various types of ledger is identical; they differ only in construction. In the "card" system the card is "ledger ruled." The cards are housed in a suitable box, and instead of an index the accounts (one on each card) are filed in alphabetical order. The "loose-leaf" ledger differs from the bound style in that the binding is mechanical and may be locked or unlocked at will. This permits the withdrawal of completed pages, and their replacement with new ones.

Diary.

It may be that invoices and documents required to provide the necessary detail for original entries become lost. Also, it is possible to overlook some transactions which should be recorded in the financial books. Such happenings seriously interfere with bookkeeping, and in order to minimize this danger it is advisable to use a diary.

Any diary of foolscap size is suitable. Transactions day by day should be recorded in its pages, together with any memoranda likely to be of value in the operation of the farm. When invoices, for example, are received or forwarded, this is noted against the diary entry and, in this manner, discrepancies are easily traced and rectified.

The diary should be compiled each day, and then, in the event of there being insufficient time to carry out the bookkeeping duties, they will not be overlooked.

Posting.

As the word "post" will appear frequently in further explanations a knowledge of this term is essential. A "posting" constitutes making an entry in a ledger account. This entry, or "posting," is made from the original entry appearing in the cash sales or purchases books or journal. *No entry* is made in a ledger account unless authority for it appears in one of the books of original entry. *All* original entries must be posted to the ledger, and when such posting are effected the ledger folio (page) should be entered in the appropriate column in the book of original entry. The cash sales or purchases book or journal folio should be inserted, where provided in the ledger. This serves as a check that all postings have been made.

An Alternative Method of Recording Sales and Purchases

There is an alternative method of recording sales and purchases. As the sales and purchases books and journal are all books of original entry the two former may be regarded as subdivisions of the journal. Entries relating to sales and purchases may be made in the journal, *but this system is not recommended.*

A journal entry demands two entries—a direction to debit one account and to credit another with the subsequent necessity for two corresponding "postings" to the ledger.

The use of the day and invoice books requires only one entry, and one corresponding "posting" to the ledger, the individual "postings," which are eliminated by the use of those books, being made in total at the end of a given period.

The liability of error is reduced greatly by this elimination of unnecessary entries and postings.

Further a complete record of sales and purchases is immediately available by use of the day and invoice books.

Petty Cash Book and Petty Cash Accounts.

It will be found necessary to provide loose cash for payment of small accounts and for cash purchases. At the outset it will be necessary to estimate the amount which will be required for this purpose for over a period of, say, one month. Having done this a cheque is drawn for that amount and cashed at the bank, the actual cash being placed in a petty cash box.

As already explained, the amount involved is entered from the cheque book butt into the credit side of the cash book. It is then "posted" to the debit of "Petty Cash Account" which is opened in the ledger. This represents the amount of cash available for petty expenditure and the balance of this account remains constant. *Subsequent cheques drawn to reimburse the petty cash box for petty expenditure are not debited to "Petty Cash Account" but to "General Expenses Account."*

The method, called the "Imprest" system of keeping a petty cash book, is as follows:—

When the cheque, drawn for the above purpose, is cashed, the amount is entered into the *debit* side of the petty cash book. *Expenditure*, when incurred, is entered into the credit

Dr. **CASH BOOK.** *Cr.*

Date.	Name.	Receipt No.	Folio.	£	s.	d.	£	s.	d.	Date.	Name.	Cheque No.	Folio.	£	s.	d.
										1944 July 1	By Petty Cash Account	106102	L. 1	10		
										Aug. 1	,, General Expenses Account	106216	L. 1	8		

LEDGER.

Dr. PETTY CASH ACCOUNT. *Cr.*

Date.	Particulars.	Folio.	£	s.	d.	Date.	Particulars.	Folio.	£	s.	d.
1944 July 1	To Cash Account ..	CB. 1	10								

Dr. GENERAL EXPENSES ACCOUNT. *Cr.*

Date.	Particulars.	Folio.	£	s.	d.	Date.	Particulars.	Folio.	£	s.	d.
1944 Aug. 1	To Cash Account ..	CB. 1	8								

Dr. **PETTY CASH BOOK.** *Cr.*

Date.	Particulars.	C.B. Folio.	£	s.	d.	Date.	Particulars.	Folio.	£	s.	d.
1944 July 1	To Cash Account ..	CB. 1	10			1944 July 2	By Cartage ..		6		
						6	,, Fuel		1	5	
						7	,, Spray			6	
						9	,, Adjustment to car			4	
						20	,, Stationery ..			5	
						Aug. 1	,, Balance B/D ..		2		
			10						10		
Aug. 1	To Balance C/D ..		2								
	,, Cash Account ..	CB. 1	8								

side thereof, and the balance of this book will, at all times, represent the amount of cash remaining in the petty cash box.

As the cash is depleted, it is necessary to replenish the petty cash box. This is done by drawing another cheque for the amount of expenditure to date. The cash resulting from this procedure is placed in the box, which will then contain the original amount. It is this and subsequent such cheques that are posted from the cash book to the debit of "General Expenses Account" in the ledger. An example of the operation of the Petty Cash Account and Petty Cash Book is given on the previous page.

It should be particularly noted that the petty cash book is a book of *memorandum* only, and is used for the purpose of recording small expenditure so that such can be incorporated in the financial books.

It has been the object, thus far, to present the books required, together with various matters relating to each.

It has been shown how the books of original entry are compiled from various memoranda. Also, the ledger has been introduced and the operation of petty cash account outlined. Therefore, with original entries made in the books concerned, the next step is to summarize these entries in the *ledger*.

Procedure

Firstly, an account for each person who is a *Debtor* must be opened in a portion of the ledger set aside for that purpose.

Secondly a similar account is opened for each *Creditor* in another part of the ledger.

Thirdly, an account is opened for *each item of expense,* each *asset,* and each *liability,* and for *sales and purchases under the various classifications shown in the sales and purchases books* —this in another part of the ledger. The ledger thus falls into three divisions. The first and second contain those accounts called "personal" and the third those called "impersonal" or "nominal." Subdivision of the ledger in this manner is methodical, and materially assists in bookkeeping, because accounts will be continually needed for "posting" and quick reference to them is essential.

Having opened these accounts, the procedure to transfer the information from original books may be summarized as follows, bearing in mind the bookkeeping rules, *Debit the Receiver; Credit the Giver.*

(*a*) All entries appearing on the *debit* side of the cash book are posted to the credit side of the account concerned in the ledger. All entries appearing on the *credit* side of the cash book are posted to the *debit* side of the ledger account concerned.

The original *debit* in the cash book represents a receipt by cash account, which is the receiver and therefore *debited.* By posting to the *credit* of the account concerned in the ledger the *giver is credited.* Likewise, cash account being the giver of expenditure is originally *credited.* By posting these entries to the debit side of the account in the ledger, the receiver (payee) is *debited.*

(*b*) Each entry in the sales book is posted to the debit of the ledger account concerned. Periodically, usually monthly, the various columns are totalled and the totals posted to the credit of the various sales accounts in the ledger.

(*c*) Each entry in the purchases book is posted to the *credit* of the account in the ledger, and the monthly totals of the analyses columns are posted to the debit of the various purchases accounts concerned.

The postings to the ledger from the sales and purchases books have the effect of debiting the receiver (the buyer from the sales book and purchases account from the purchases book) and crediting the giver (sales account from the sales book and the *seller* from the purchases book).

(*d*) Journal entries are posted to the ledger as directed by the entry itself.

Bookkeeping Procedure

Before the daily transactions are recorded, it is important that the position of the farmer at the beginning of the accounting period be ascertained and incorporated in the books.

If the farm is a new venture the entries will appear in the books of original entry in ordinary course. As an example, those necessary to record the under-mentioned transactions would be as shown:—

Banked £1,000 capital; bought from A. Jones and received invoice for plant, £60; paid deposit on land, £800; bought from A. Brown goods, £20; paid for same; bought horses for cash, £100; paid insurance on property, £6 (For simplicity, folio, receipt, and cheque numbers and dates are omitted.)

CASH BOOK.

Dr. *Cr.*

Date.	Name.	Receipt No.	Folio.	£	s.	d.	£	s.	d.	Date.	Particulars.	Cheque No.	Folio.	£	s.	d.
	To Capital Account ..			1000			1000				By Land Account (deposit			800		
											,, A. Brown Account			20		
											,, Horses Account			100		
											,, Insurance Account			6		

PURCHASES BOOK.

Date.	Name.	Particulars.	Folio.	Manure.			Seed.			Fodder.			Sheep.			Cattle.			Misc.			Household.		
				£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
	A. Brown	Groceries																				20		

JOURNAL.

Date.	Particulars.	Folio.	Dr.			Cr.		
			£	s.	d.	£	s.	d.
	Plant Account Dr.		60					
	To A. Jones Account Cr.					60		
	being purchase of new press							

LEDGER.

Dr. CAPITAL ACCOUNT. *Cr.*

Date.	Particulars.	Folio.	£	s.	d.	Date.	Particulars.	Folio.	£	s.	d.
							By Cash		1,000		

Dr. PLANT ACCOUNT. *Cr.*

Date.	Particulars.	Folio.	£	s.	d.	Date.	Particulars.	Folio.	£	s.	d.
	To A. Jones Account		60								

LEDGER—*continued.*

Dr. LAND ACCOUNT. *Cr.*

Date.	Particulars.	Folio.	£	s.	d.	Date.	Particulars.	Folio.	£	s.	d.
	To Cash Account (Deposit) ..		800								

Dr. INSURANCE ACCOUNT. *Cr.*

Date.	Particulars.	Folio.	£	s.	d.	Date.	Particulars.	Folio.	£	s.	d.
	To Cash Account ..		6								

Dr. HORSES ACCOUNT. *Cr.*

Date.	Particulars.	Folio.	£	s.	d.	Date.	Particulars.	Folio.	£	s.	d.
	To Cash Account ..		100								

Dr. HOUSEHOLD PURCHASES ACCOUNT. *Cr.*

Date.	Particulars.	Folio.	£	s.	d.	Date.	Particulars.	Folio.	£	s.	d.
	To Purchases as per Purchases Book ..		20								

Dr. A. JONES ACCOUNT. *Cr.*

Date.	Particulars.	Folio.	£	s.	d.	Date.	Particulars.	Folio.	£	s.	d.
							By Plant Account..		60		

Dr A. BROWN ACCOUNT. *Cr.*

Date.	Particulars.	Folio.	£	s.	d.	Date.	Particulars.	Folio.	£	s.	d.
	To Cash Account ..		20				By Goods ..		20		

But where the farm is a *going concern* at the time of commencement of accounting, the position in incorporated in the books by journal entry. Thus—

JOURNAL.

		£	£
Cash account	Dr.	620	
Sundry debtors account ..	Dr.	140	
Machinery, &c., account ..	Dr.	200	
Tools account	Dr.	60	
Land account	Dr.	2,100	
Live stock account ..	Dr.	100	
Crops account	Dr.	250	
Stock on hand account ..	Dr.	400	
Buildings account ..	Dr.	600	
To sundry creditors account	Cr.		120
Capital account ..	Cr.		4,350

In these circumstances it frequently happens that the value of assets is not known. It is necessary therefore to adopt a method of valuation in order to prepare the journal entry.

Different methods of valuation are adopted according to the nature of the asset concerned. It is always advisable to avoid over-valuation.

A schedule showing the class, number, and value of all *live stock* should be prepared for valuation purposes.

Growing crops are valued at cost of labour, seed, and manure to date.

Farm produce on hand is included at cost price or market value, whichever is the lower.

Plant and machinery should, if new, be valued at cost, otherwise the basis of valuation should be the proportion of cost remaining after deducting the loss by depreciation to date.

Depreciation

Depreciation is defined as a decline in value. It will be readily understood that certain assets, particularly those of a mechanical nature, and to a lesser degree, buildings, depreciate in the course of use, and time. This reduction of value is a definite loss to the farmer and, as such, should be charged as an expense, in each year during the life of the asset.

In order to assess the amount by which any asset depreciates, it is necessary to know—

(*a*) present value;
(*b*) estimated life; and
(*c*) residual value.

From this information the annual depreciation can be ascertained, and charged to "Profit and Loss Account.

Example: Present value, £20.
Estimated life, 10 years.
Residual value, £1.

£20 less £1—£19 to be extinguished over a period of ten years—£1 18s. per annum.

The Trial Balance

All transactions during the accountancy year are entered, first into the books of original entry, and then by "postings" into the ledger. This done, the preparation of the final account can be proceeded with. But before doing so it is well to prove the clerical accuracy of the books at this stage.

This is done by extraction of a "Trial Balance." For this the ledger and cash book only are needed.

The debit and credit sides of each account in these books are added (usually in pencil), the balances being transferred to a memorandum sheet, which is preserved for future reference. If all postings have been accurately made, both sides of the "Trial Balance," as in the following example, will agree.

When the entries which have been posted to the debit side of an account equal, in total, those posted to the credit side, the account is said to *balance*.

In all other cases, an account will show either a *debit balance* or a *credit balance*.

An account is said to have a *debit balance* when the total of the *debits* exceeds that of the credits, and to have a *credit balance* when the total of the *credits* exceeds that of the debits.

This is most important and should be thoroughly understood.

TRIAL BALANCE.

	Dr. £	Cr. £
Cash account	650	—
Petty cash account	10	—
Land account	4,000	—
Buildings account	1,000	—
Furniture account	200	—
Machinery account	600	—
Car account	120	—
Tractor account	160	—
Stock on hand account	660	—
Capital account	—	7,020
Sundry creditors account ..	—	140
Sundry debtors account	400	—
General expenses account ..	90	—
Insurance account	20	—
Wages account	300	—
Cattle sales account	—	250
Grain sales account	—	800
Sheep sales account	—	500
Miscellaneous sales account ..	—	100
Seed purchases account ..	90	—
Fodder purchases account ..	250	—
Miscellaneous purchases account ..	40	—
Household purchases account ..	220	—
	£8,810	£8,810

Profit and Loss Account

Of the above accounts, those relating to Capital, Assets, Liabilities and Persons are excluded for the purpose of preparation of the "Profit and Loss Account." The remaining, called "Nominal" accounts, together with stocks on hand at the beginning and the end of the year, are required.

But before it is possible to proceed it is necessary that stock on hand at balance time be ascertained, and various assets "depreciated" to their correct value.

Stocktaking.—A complete schedule of all assets comprising "Stock on Hand" must be compiled. Sufficient detail to identify each, and the number and value of each item (e.g., sheep, horses, cattle, &c.) must be shown on this schedule, the total of which will represent the value of stock on hand. Valuations should not be excessive. Where possible, stock should be taken by actual count and strict accuracy practised, because the value at which such is included in the "Profit and Loss Account" materially affects the profit or loss on operations. Stock on hand at the end of the year is incorporated in the accounts by journal entry.

Stock on hand account	Dr.	£1,000	—
To Profit and Loss Account	Cr.	—	£1,000

Depreciation is assessed on such assets as are subject to annual reduction in value from this cause. The rate and amount having been ascertained, the resultant figures are recorded by journal entry:—

			£	£
Depreciation account	Dr.		148	
To Buildings account		Cr. (5%)	—	50
To Furniture account		Cr. (5%)	—	10
To Machinery account		Cr. (10%)	—	66
To Car account		Cr. (10%)	—	12
To Tractor account		Cr. (10%)	—	16

being depreciation on assets for financial year 1943-44.

When these postings have been made to the appropriate ledger accounts, they will appear thus:—

LEDGER.

Dr. BUILDINGS ACCOUNT. *Cr.*

Date.	Particulars.	Folio.	£	s.	d.	Date.	Particulars.	Folio.	£	s.	d.
	To Balance ..		1,000				By Depreciation Account ..	J.	50		
							„ Balance C/D ..		950		
			1,000						1,000		
	To Balance B/D ..		950								

Dr. FURNITURE ACCOUNT. *Cr.*

Date.	Particulars.	Folio.	£	s.	d.	Date.	Particulars.	Folio.	£	s.	d.
	To Balance ..		200				By Depreciation Account ..	J.	10		
							„ Balance Account C/D		190		
			200						200		
	To Balance B/D ..		190								

Dr MACHINERY ACCOUNT. *Cr.*

Date.	Particulars.	Folio.	£	s.	d.	Date.	Particulars.	Folio.	£	s.	d.
	To Balance ..		600				By Depreciation Account ..	J.	60		
							,, Balance C/D ..		540		
			600						600		
	To Balance B/D ..		540								

Dr. CAR ACCOUNT. *Cr.*

Date.	Particulars.	Folio.	£	s.	d.	Date.	Particulars.	Folio.	£	s.	d.
	To Balance ..		120				By Depreciation Account ..	J.	12		
							,, Balance C/D ..		108		
			120						120		
	To Balance B/D ..		108								

Dr. TRACTOR ACCOUNT. *Cr.*

Date.	Particulars.	Folio.	£	s.	d.	Date.	Particulars.	Folio.	£	s.	d.
	To Balance ..		160				By Depreciation Account ..	J.	16		
							,, Balance C/D ..		144		
			160						160		
	To Balance B/D ...		144								

Dr. DEPRECIATION ACCOUNT. *Cr.*

Date.	Particulars.	Folio.	£	s.	d.	Date.	Particulars.	Folio.	£	s.	d.
	To various Assets Accounts ..	J.	148								

The Profit and Loss Account is actually a summary of all accounts relating to *losses* and *gains*. The journal entry, which is compiled to bring this account into being, has the effect of "closing" these nominal accounts and transferring them to the "Profit and Loss Account." Note that this account is *debited* with losses and *credited* with gains.

As will be seen by the example given, the net profit (or loss) is transferred to "Capital Account." This is done by journal entry.

It will be noticed that the item "Household Expenses" (or purchases) has been debited to "Profit and Loss Account." An alternative method, which renders compilation of returns for taxation purposes much less complicated and, for that reason, is recommended, is to debit all household expenses direct to a "Drawings Account" which is opened in the ledger. Also, all cheques which are drawn for *personal requirements,* which in fact are appropriations of cash in anticipation of profits, are debited *direct* from the cash book to "Drawings Account." Drawings account at balancing time is transferred by journal entry to "Capital account" and has the effect of reducing that account by the amount drawn during the year (see example next page).

JOURNAL.		£	£
Profit and loss account ..	Dr.	1,818	—
To Stock on hand (beginning of period)	Cr.	—	660
Seed purchases account ..	Cr.	—	90
Fodder purchases account	Cr.	—	250
Miscellaneous purchases account	Cr.	—	40
Household purchases account	Cr.	—	220
General expenses account	Cr.	—	90
Insurance account ..	Cr.	—	20
Wages account ..	Cr.	—	300
Depreciation account ..	Cr.	—	148
Cattle sales account	Dr.	250	—
Grain sales account	Dr.	800	—
Sheep sales account	Dr.	500	—
Miscellaneous sales account ..	Dr.	100	—
To Profit and Loss ..	Cr.	—	1,650
Stock on hand account (end of period as per schedule) ..	Dr.	1,000	—
To Profit and Loss account ..	Cr.	—	1,000

Dr. **PROFIT AND LOSS ACCOUNT.** *Cr.*

Date.	Particulars.	Folio.	£	s.	d.	Date.	Particulars.	Folio.	£	s.	d.
	To Stock on hand Account ..		660				By Cattle Sales Account ..		250		
	,, Seed Purchases Account ..		90				,, Grain Sales Account ..		800		
	,, Fodder Purchases Account ..		250				,, Sheep Sales Account ..		500		
	,, Misc. Purchases Account ..		40				,, Misc. Sales Account ..		100		
	,, Household Purchases Account		220				,, Stock on Hand Account ..		1,000		
	,, General Expenses Account ..		90								
	,, Insurance Account ..		20								
	,, Wages Account..		300								
	,, Depreciation Account ..		148								
	,, Profit C/D ..		832								
			2,650						2,650		
	,, Capital Account		832				,, Balance B/D (Profit) ..		832		

Dr. **CAPITAL ACCOUNT.** *Cr.*

Date.	Particulars.	Folio.	£	s.	d.	Date.	Particulars.	Folio.	£	s.	d.
	To Drawings Account ..		220				By Balance ..		7,020		
	,, Balance C/D ..		7,852				,, Profit and Loss Account ..		1,052		
							(N.B.—£832 + £220 = £1,052)				
			8,072						8,072		
							By Balance B/D ..		7,852		

The Balance Sheet

The "expense and gain" accounts have, by the above-mentioned entries been "closed;" and and it is from the remaining "open" accounts that the "Balance Sheet" is compiled.

They comprise *asset, liability,* and *capital* accounts. Assets are always shown on the *right-hand* and liabilities on the *left-hand* side of the balance sheet. The terms *Debit* and *Credit* are never used in this connexion.

Asset account balances in the ledger appear on the debit side of the account, while those of liability accounts appear on the credit side.

BALANCE SHEET.

Liabilities.	£	£	s.	d.	Assets.	£	£	s.	d.
Sundry Creditors		140			Cash at Bank	650			
Capital	7,020				Petty Cash	10			
Profit	832						660		
		7,852			Land		4,000		
					Buildings	1,000			
					Less depreciation ..	50			
							950		
					Furniture	200			
					Less depreciation ..	10			
							190		
					Machinery	600			
					Less depreciation ..	60			
							540		
					Car	120			
					Less depreciation ..	12			
							108		
					Tractor	160			
					Less depreciation ..	16			
							144		
					Sundry Debtors		400		
					Stock on Hand (showing individual totals, sheep, cattle, &c.) ..		1,000		
		7,992					7,992		

In the balance sheet this is reversed, i.e., the balance appears on the opposite side of the "Balance Sheet" to that in the ledger account. This is in accordance with bookkeeping custom and although universally applied has no special significance.

Rations

A special note regarding the treatment of rations, in the accounts, will be of value. Rations, when used, should be allocated between "Household Expense Account" and "General Expenses Account." The former should be debited with rations killed or otherwise used for *ordinary living purposes,* whilst the latter should be debited with those used for *sustenance of farm labour, &c.* In each case the "Sales Account" for the produce concerned is *credited.* These transactions are recorded by journal entry.

Conclusion

The object of the foregoing has been to present, in a form suitable for the learner, the principles of bookkeeping, stage by stage, from the initial entries to the final balance sheet. Lack of space precludes the mention of many factors which involve special bookkeeping entries, but in all such cases the principles outlined apply, and can be adapted to suit requirements. Bookkeeping is a necessary adjunct to farming as it is to any business.

It is recommended that the various stages as they appear in the foregoing article shall be taken singly, and the principles and rules outlined in each mastered in turn. While bookkeeping may appear to be a complicated and technical subject to the layman, if it is approached in this manner, good progress can be made in a reasonable time.

GARDEN NOTES—(*Continued from page 314*).

bed add organic matter, either well-decayed stable manure or fowl manure, or if this is unobtainable, decomposed compost should be dug in. An application of market garden manure at the rate of 2 or 3 oz. to the square yard when preparing the bed will be found very useful.

Onions

Victorian Brown, Brown Spanish and *White Imperial Spanish* varieties of onions may be planted out this month. Rows are usually spaced 10 inches apart and the plants are placed 3 to 4 inches apart in the rows. If plants are unobtainable, then the seed may be sown in drills in the permanent beds. It is now too late to sow seed of these varieties in seed beds and then later transplant them, but if they are sown in their permanent positions in drill rows, they can be later thinned out and will produce quite a good crop.

Be sure to take out the small weeds as soon as they appear in the onion bed; the removal of large weeds will disturb the shallow root system of these plants. Large weeds if left in the bed rob the crop of plant food.

Leeks

Seed of leeks may be sown this month. Popular varieties are *Mussleburgh, London Flag Lyon* and *Holborn Model.* Sow the seed in seed beds and cover to a depth of ½-in. with fine sandy soil. Firm the seed bed after sowing by patting it with the back of the spade. Plants of these varieties may also be transplanted into their permanent positions now. Space the rows about 20 inches apart and allow 6 inches between each plant. It is a good practice to have the beds raised as in the case of all winter vegetables and then to plant the leek seedlings in a trench about 6 inches deep. As the plants grow this trench is gradually filled in and the soil covering ensures good blanching of the stems. It also assists in producing longer stems.

Asparagus

An asparagus bed can be planted this month; for preference use two-year-old seedlings. Preparation of the bed is most important, because this crop will remain producing for eight or ten years. Dig in large quantities of organic matter and trench to a depth of 12 to 15 inches. Plant the seedling crowns 18 inches apart each way and 6 to 8 inches deep. Be careful not to allow the crowns to dry out before planting them. For the first two seasons do not cut any tips. Cutting can commence in the third season when the plants are strong and vigorous.

MARMALADE

from

Sweet Oranges, Lemons, and Cumquats

By RACHEL M. PEILE, Fruit Preserving Expert

THIS year many varieties of citrus fruits will be unobtainable for marmalade, with the exception of sweet oranges, lemons and a limited supply of cumquats. Housewives therefore may find it difficult to make their usual supplies of marmalade, but although the jam oranges Poorman and Seville, and grapefruit are not available in the shops, delicious marmalades can be made with lemons and sweet oranges alone or in combination, or combined with apples, carrots or pineapple. An excellent marmalade also can be made from bottled oranges. Sweet orange peel marmalade is also popular, while, for a more unusual product, cumquats may be used. This fruit gives a tart but delicious flavour.

The following recipes should provide the family with a varied range of marmalades.

Lemon Marmalade

Thoroughly cleanse and weigh the lemons. Halve each fruit and remove the centre core or rag. Separate the pulp from the peels and shred the peels finely. Place the peels in a bowl, cover with boiling water and allow to stand for two hours. This is a shorter method than soaking overnight and is just as effective. Add the pulp, finely cut, and one quart of water to each pound of fruit. Add also half a tablespoon of lemon juice to each pound of fruit. Simmer all together in the preserving pan with the lid on until the peels are quite tender (about three-quarters to one hour), then measure the mixture by cup and add equal measures of sugar. When the sugar is quite dissolved, boil the mixture rapidly with the lid off the pan, skimming if necessary, until the setting stage is reached. This may be ascertained by dipping the stirring rod into the mixture, then holding it up horizontally on its edge and watching the drops as they fall. When the drops fall heavily in sheets or flakes the marmalade is ready for bottling.

Prolonged boiling of the marmalade after the sugar has been added should be avoided, for it not only spoils the flavour and darkens the colour, but also affects the pectin contained in the fruit and causes loss of the jellying properties. If the boiling mixture is watched carefully and testing is done as soon as it begins to rise in the pan, this will reduce the likelihood of the marmalade being overboiled. The time taken for the setting stage to be reached varies with the seasons, but it is usually between 20 and 40 minutes after rapid boiling has commenced.

When the setting stage has been reached, lift the pan from the fire and allow the contents to cool very slightly before bottling. If the marmalade is bottled too hot, the pulp will rise to the top of the jar, leaving clear jelly at the bottom. Bottle in warm, dry jars.

Sweet Orange Marmalade

The same method should be used as for lemon marmalade, but when adding water, one pint only should be added to each pound of fruit.

Marmalade from Bottled Oranges

Drain the syrup from bottled oranges and weigh the fruit. Shred fairly finely and remove pips. To each pound of oranges add half a tablespoon of lemon juice. Add the syrup, then boil the mixture gently for 15 minutes with the lid on the pan. Measure the mixture by cup and add half a cup of sugar to each cup of pulp and syrup. Allow the sugar to

dissolve, then boil the mixture rapidly with the lid off the pan till of a good consistency.

The colour of this marmalade is not as bright as when fresh oranges are used, but it has a good flavour and consistency.

Carrot and Lemon Marmalade

Slice 7 large lemons (2½ lb.) very thinly, rejecting the pips. Grate a large carrot about 1 lb. in weight on a coarse grater. Allow 6 lb. sugar and 6 pints water. Put lemon, carrot and water into the preserving pan without preliminary soaking with 3 tablespoons of lemon juice. Bring slowly to the boil. Simmer one hour with lid on pan, add sugar and allow it to dissolve. Boil for one hour or until the mixture jellies.

These quantities make approximately ten 1 lb. pots. Oranges may be used in place of lemons.

Apple and Orange Jam

(*An Excellent Substitute for Marmalade.*)

3 sweet oranges (4 if small).
3 lb. tart cooking apples.
2 lb. sugar.

Water to make up one quart with orange juice.

Peel, core and cut up the apples. Place them in a preserving pan. Grate the orange rind and extract the juice and add rind to the apples. Add water and orange. Cook slowly with lid on the pan for half an hour or until the apples are tender. Add sugar, allow it to dissolve, then boil the jam until it is of a good consistency. Lemons may be used instead of oranges if preferred, using 6 lemons to 3 lb. of apples.

Cumquat Marmalade

1 lb. cumquats.
1 quart water.

Clean the cumquats with a brush and water. Cover with scalding soda water, using a heaped dessertspoon of carbonate of soda to 1 quart of water, and allow to stand for five minutes. Rinse in clear water, then slice the fruit and remove seeds. Add the water and cook the fruit slowly for three-quarters to one hour, then measure by cup and to each cup of juice and pulp add 1 cup of sugar. Boil rapidly till it sets.

Orange Peel Marmalade

This recipe is very economical, as it utilizes the peels from sweet oranges which are often discarded.

2 cups of finely cut peel.
2 pints of water.
2 medium lemons.
2¼ lb. sugar.

Soak the peels in water overnight or for two hours in boiling water. Add the strained lemon juice and simmer, with the lid on the pan, till cooked, then add the sugar. When thoroughly disolved, boil rapidly until the setting stage is reached. The lemon peel may be cut finely and cooked with the orange peel, or the half pieces may be put in and removed when the sugar is added.

Orange and Pineapple Marmalade

1 medium pineapple.
4 sweet oranges.
1 lemon.
1 quart water to each lb. fruit.
Sugar.

Peel and shred the pineapple. Shred the oranges and lemon very thinly after weighing the fruit. Add the water and let the fruit soak overnight. Boil it gently the next day for one hour. Measure the mixture by cup and add cup for cup of sugar. Allow the sugar to dissolve. Boil the mixture rapidly until it sets.

Points to Remember in Marmalade Making.

Allow all marmalades to stand for three minutes before bottling.

Be sure that the shredded rinds are tender before adding the sugar.

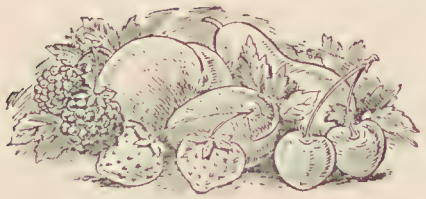
To all marmalades add a little extra lemon juice (half-tablespoon to each lb. fruit). This ensures an easier set.

All citrus fruits should be fresh.

To Keep Lemons and Oranges

Lemons and Oranges will keep for some time on the tree. When picked they should be cut with half an inch of stalk on the top and packed in a barrel or box between layers of dry sand or sawdust. They must be perfectly dry and free from blemishes. When packed they should not touch each other or the sides of the box. A layer of sand or sawdust should cover the top. Wrapping in tissue paper also helps to keep lemons and oranges.

Various Ways of Using—



Preserved Fruits and Vegetables

By RACHEL M. PEILE, Fruit Preserving Expert

PRESERVED fruits come into their own during the winter months when the wisdom of home preservation of fruits in their season is most apparent.

Bottled fruits and dried vegetables occupy an important part in meal planning, and these foods can be utilized in many palatable and nourishing dishes.

Recipes are given hereunder, care having been taken to select those which involve the use of little or no butter and few eggs.

Bottled Fruits and Fruit Pulps

Bottled fruit can be used in place of fresh fruit, but extra sugar need not be added. The syrup from the fruit may be thickened and added, or it may be thickened and used as a fruit sauce, or used separately in fruit drinks.

Rhubarb Roll.

1½ cups of self-raising flour.
1 dessertspoon sugar.
Milk to mix.
1 tablespoon clarified fat.
¼ teaspoon salt.

Rub fat into sifted flour and salt and add milk to mix to a firm dough. Roll out ½-inch thick and spread with bottled rhubarb which has been drained; sugar and a squeeze of lemon juice. Roll up and put into a greased pie-dish and cover with the following mixture:—One cup boiling rhubarb syrup, ¼ cup sugar, a walnut of butter mixed together. Bake in a moderate oven.

Savoy Custard.

Stale sponge cake.
1 jar bottled fruit.
½ to 1 pint custard sauce (fairly thick).
A little whipped cream if available.

Slice sponge through the centre. Put a layer of drained fruit in between slices. Prick the top of the sponge with a fork and sprinkle with fruit syrup. Place another layer of fruit on top of sponge and mask the whole with a thick custard. Decorate with fresh or mock cream, or a fruit sauce made from left-over syrup thickened with a little butter, sugar and cornflour.

Hot Plum Mould.

Soak stale bread in hot water for 20 minutes. Strain off the water and mash the bread with a fork, adding a walnut of butter. Butter a basin and line it with the softened bread, then fill it up with alternate layers of bottled plums or prunes and sugar. When the basin is filled cover the top well with greased paper and steam for 2 hours. Serve with custard or fruit sauce. Fruit pulp may be used in place of bottled fruit.

New Way Fruit Pie.

Drain a jar of bottled fruit and thicken the liquid—to each cup using 1 teaspoon cornflour, ½ teaspoon butter, and 1 dessertspoon sugar, blended in a little water. When cool sprinkle in ½ teaspoon cinnamon. Line a buttered pie-dish with a thin layer of good short crust. Put in the drained fruit, then pour the thickened liquid over it. Cover the top with short crust, then bake in a moderate to hot oven. This is a delicious way of making all fruit pies. Scraps of pastry may be used for small rolls or tartlets, with jam fruit butters or dried fruit as fillings.

Currant and Quince Layer Pudding.

Place a layer of bottled quince or apple pulp on the bottom of a buttered pie-dish. Cover with slices of bread and sprinkle with sugar, currants and cinnamon. Continue in layers

until the pie-dish is full. Sprinkle finally with cinnamon and put dabs of butter on top. Bake for ½ hour in moderately hot oven. Any syrup from the bottled fruit may be poured through the mixture. Serve with custard.

Gooseberry Layer Pudding.

Take two eggs and their weight in self-raising flour, castor sugar and butter. Beat the butter and sugar to a cream. Beat the yolks of the eggs together with 2 tablespoons milk, then add to the creamed mixture. Beat well and sift in the flour with a pinch of salt. Add the grated rind of a lemon, then fold in the stiffly beaten egg whites. Put a layer of batter in a greased pie-dish. Cover with bottled gooseberries, then add another layer of batter. Continue in layers until the dish is full, having a layer of batter on top. Bake in a hot oven for 30 minutes or until firmly set.

Bottled Tomatoes and Tomato Pulp

Bottled tomatoes and tomato pulp can be used in several ways. Used with dried vegetables, cheese, onions, potatoes, savoury sauces, meat, &c., they can form the main dish in any meal and supply valuable quantities of vitamin C, this being important for general health and essential for teeth and bone.

Savoury Rabbit and Tomato.

Simmer rabbit in salted water until tender Remove the bones, cut the meat into small pieces and mix it with two slices of cooked bacon (diced), 1 large cup of tomato pulp or bottled tomatoes, and 2 cups mashed potatoes. Beat 1 egg well. Add 1 tablespoon milk and 2 cups of breadcrumbs and mix all ingredients, seasoning with salt and pepper. Pour into a well-greased dish and bake in a hot oven for 20 minutes.

Tomato and Onion Roll.

8 oz. flour.
½ teaspoon salt.
¾ cup soft breadcrumbs.
4 oz. dripping.
Water.
3 medium-sized onions.
1 cup finely grated potato.
1 cup bottled whole tomatoes (well drained).
Pepper and salt.

Sift flour and salt. Rub in fat and mix to dry dough with water. Roll fairly thinly. Slice onions. Cover pastry with the sliced onions, then with the breadcrumbs, then the tomatoes, and lastly the potatoes. Season each layer well. Moisten edges of pastry and roll up. Bake in moderate oven for 30 minutes.

Bean and Tomato Savoury.

Slice two onions very thinly and grate 2 carrots on a coarse grater. Mix with a cupful of cooked haricot beans and a cupful of partly cooked macaroni. Add two cups bottled tomatoes or one cup tomato pulp. Cook the mixture slightly. Season well with salt and pepper. Slice two hard-boiled eggs and put at the bottom of a greased pie-dish. Pour on the tomato mixture. Put some dabs of butter on top and cook in a moderate oven for 35 minutes.

Jams and Marmalades

Jam and marmalade can be used in many ways besides the ubiquitous "bread and jam." Stocks of jam supplies which perhaps have been "left behind" on the shelf in favour of newer supplies will give good flavour to cakes and puddings. Some recipes are given below for their use:—

Union Pudding.

1 dessertspoon butter.
¼ cup sugar.
1 egg.
½ cup self-raising flour.
¼ cup milk.
1 good dessertspoon dark jam.

Cream butter and sugar, add egg and beat, then gradually add milk. Mix well and add jam, then lastly the flour. This pudding is improved if a layer of jam is placed on the bottom of the basin before the batter is poured in. Steam slowly for 3 hours.

Marmalade Cake.

Any marmalade may be used in this mixture, and it gives the cake a pleasantly sharp flavour.

Cream 2 oz. butter and 2 oz. clarified fat with 4 oz. sugar. Beat in 1 large or 2 small eggs. Stir in 2 tablespoons marmalade and fold in the sifted flour (6 oz. self-raising flour). If 2 eggs are used avoid using the thinner part of the marmalade. Bake for ¾ hour in a fairly slow oven.

Apricot Sandwich.

2 oz. butter.
2 oz. clarified fat.
6 oz. flour.
2 eggs.
1 tablespoon apricot jam.
1 tablespoon milk.

Cream fat and sugar and add beaten eggs. Add the milk gradually and then jam, then the sifted flour. Fold all in gently then pour into two small greased sandwich tins. Bake for 15 to 20 minutes. When cold put together with apricot jam, and ice with white icing which includes 1 tablespoon of apricot jam.

Dried Fruits and Vegetables

Dried fruits and vegetables are a useful substitute for the fresh article, and the following recipes provide numerous ways in which they may be used.

Apricot Whip.

1 tablespoon gelatine.
2 cups water.
1 egg white.
¼ cup cold water.
½ lb. dried apricots.
Sugar to taste.

Stew apricots in 2 cups water with sugar. Mash through a sieve to make a puree. Soak gelatine in ¼ cup cold water for 10 minutes. Stand in hot water and stir till dissolved. Add to puree; allow to almost set, then fold in egg white (stiffly beaten). When set, turn out and decorate.

Fruit Biscuits.

4 oz. cornflour.
2 oz. S.R. flour.
3 oz. sugar.
A few drops of vanilla essence.
2 oz. butter.
2 oz. clarified fat.
Dried fruit (apricots, plums, figs, or peaches).

Partly cook the dried fruit and drain well. Cream fat and sugar; add essence. Sift dry ingredients and work into creamed mixture. Roll out and cut into small rounds. Place a piece of fruit on each round with a sprinkling of sugar. Press another circle of mixture on top, press down, then bake in a moderate oven for 15 minutes.

Plum Sponge.

1 egg.
2 tablespoons melted butter.
1 tablespoon sugar.
Pinch of salt.
½ lb. dried plums.
1 cup flour.
1 small teaspoon bicarb. soda.
1 large teaspoon cream of tartar or substitute.
4 tablespoons milk.
Flavouring.

Stone plums and stew with a little sugar and water; beat egg and sugar together, add milk, melted butter, and sifted flour, rising, and salt; put hot stewed plums into a pie-dish and pour the batter on top. Bake at once in a very hot oven at first, then remove to a lower part of the oven to cook through (about ½ hour). Serve hot or cold sprinkled with sugar.

Bacon and Mushroom Toast.

4 rashers of bacon.
8 rounds toast.
2 oz. dried mushrooms.
Salt and pepper.

Soak the mushrooms for 2 hours. Cook the mushrooms in a little of the water for 5 minutes. Fry the bacon. Pour a little bacon fat on each piece of toast and spread the bacon on each piece. Pile the mushrooms on top. If preferred the mushrooms may be cooked the day before when they should be left in the liquor until needed.

Dried Peas au Gratin.

8 oz. dried peas.
½ oz. butter.
3 oz. grated cheese.
Cayenne, salt, milk.

Soak the peas overnight. Boil them until tender and drain well. Add the butter and cheese, a little milk, and 1 dessertspoon blended flour. Boil for 2 minutes. Stir well and serve on buttered toast or with potato chips.

Scalloped French Beans.

4 oz. dried French beans.
2 oz. grated cheese.
1 oz. good dripping or butter.
3 hard boiled eggs.
1 tablespoon brown bread crumbs.
½ pint white sauce.

Grease a pie-dish, put in a layer of cooked beans. Sprinkle with salt and pepper, then cover with sliced, hard-boiled egg. Repeat layers until dish is full, using beans for the top layer. Make the white sauce and pour over. Grated cheese may be added. Sprinkle with breadcrumbs, put a few dabs of butter on the top and bake for 20 minutes in a moderate oven.

Savoury and Fruit Fillings

Savoury and fruit fillings can be used for cakes, sandwiches, biscuits, and chutneys, while fruit butters will be found popular for afternoon teas and cut lunches. Apples, pears, peaches and plums when they are boiled down to a thick consistency require very little sugar, and they are most nutritious when spread on brown bread or in biscuits or tartlets. The fruit butter may be used as it is or as flavouring in cake fillings, mixing it with butter, sugar, water and cornflour.

Left-over stewed or bottled fruit may be mashed, thickened, then used as cake or pie fillings while a tablespoon of the fruit and juice will often help to flavour icings for cakes.

Chutney often gives a piquant flavour to sandwiches and savouries, and when added to meat pies, rissoles and pasties is a great improvement.

Tubercle-free Herds

ACCREDITED TUBERCLE-FREE HERDS.

The following herds have been declared free of tuberculosis under the *Accredited Tubercle-free Herd Scheme* conducted by the Department of Agriculture. Under this scheme a tubercle-free accredited herd of cattle is one in which the entire herd has passed two negative, successive, annual physical examinations and tuberculin tests, or upon disclosure of infection, three semi-annual, successive physical examinations and tuberculin tests applied by a State Veterinarian or by a qualified and registered veterinarian who is approved by the Chief Veterinary Inspector for that purpose.

Name.	Address.	Number in Herd.
Armstrong and Son	Wangaratta	105
Ballarat Orphanage	Ballarat	102
Banyule Stud Pty. Ltd.	Wangaratta	54
Black, I. S., Estate	Mount Noorat	53
Clarke, A. B.	Glenormiston South	15
Cribbes, T.	Wangaratta	39
Deering, J. T.	South Wangaratta	61
Dennis, Mrs. A. A.	Frankston	42
Dookie Agricultural College	Dookie	85
Dunbar and Clark, Messrs.	"Hazeldean Dairy," Mount Dandenong	18
Geelong Grammar School	Corio	78
Gibson, Mrs. C. S.	"Sweeney's," Eltham	35
Gorman, A. W.	"Cathcart," Alexandra	57
Griffin, G. W.	Gladysdale	49
Griffiths, J. G.	Benalla	121
Henry, J.A.	Warrnambool	41
Howlett, Mrs. G. and Miss E. Samuel	Lang Lang	55
Jakobi, L. W.	"Granada," Yannathan	80
Kane, F. E.	Warrnambool	28
Kilmany Park Farm Home for Boys	Sale	104
Lady Talbot Milk Supply Co.	Cranbourne	479
Lawrence, P. H.	"Rainga," Tarrawarra	83
Longerenong Agricultural College	Dooen	48
Maloney P. J.	Tongala	
McNabb and Son, G. A.	Irrewillipe East	66
Nancarrow Bros.	Kerang	154
Noonan, G.	Benalla	52
Noonan, Mrs. S. A.	Benalla	30
Northcote Children's Farm	Bacchus Marsh	35
Onley, W. H.	"Glenholme," Caldermeade	164
Parker, Mrs. L. M.	Tallarook	64
Payne, A. E. T.	"Yarra View," Lilydale	56
Payne, T. E. N.	"Woodburn," Kilmore	66
Poole, M. A. and D.	Caldermeade	44
Poole, M. A. and D.	Yannathan	151
Powell, T. S.	"Carellen," Mansfield	79
Richardson Bros., Messrs.	"Faldinghurst," Upper Beaconsfield	43
School of Horticulture	Burnley	30
State Experiment Farm	Rutherglen	6
State Research Farm	Werribee	37
Stephens, Dr. F.	Vermont	245
Vagg, T. E.	Officedale	32
Wells, W. G.	Caldermeade	45
		65

In addition to the above-mentioned herds there are 736 commercial dairy herds containing 17,431 head of cattle which may be considered free of tuberculosis. All these herds have given negative reactions to two or more successive tests conducted by departmental veterinary officers, but inasmuch as replacement cows are only submitted to one test before being admitted to the herds, they cannot be considered as accredited under the accreditation scheme which requires, among other things, that no cow shall be admitted to the herds unless it has given two (2) negative reactions at an interval of 60 days, and must be kept in isolation during the period between the two tests.

There are also 437 herds in which 11,565 head of cattle have passed one test, and may be considered, therefore, to be in process of becoming tubercle-free herds.

Certified Pullorum Tested Flocks

A certified Pullorum Tested Flock is one in which all the breeding stock have given a negative reaction to the agglutination test for pullorum disease, and in which all such stock are kept under rigid conditions of isolation approved by the Chief Veterinary Inspector.

The undermentioned flocks have been certified by the Department of Agriculture, and will remain so until the next breeding season or until such time as the Chief Veterinary Inspector determines.

Full particulars of this scheme appeared in the February, 1942, issue of the *Journal of Agriculture*.

Application forms are obtainable from the Chief Veterinary Inspector, Department of Agriculture, Melbourne, C.2.

Owner.	Number of Birds.
Armstrong, D. M., Fryer's-road, Campbell's Creek	199
Bantick, H. M., Old Dandenong-road, Heatherton	435
Barastoc Experimental Farm, Central-avenue, Bayswater	229
Barlow, M., Everest-crescent, Olinda	41
Barnes, Mrs. A., "The Heights," Blackburn-road, Blackburn	2,333
Bartlett, N. M., Pimpinio	338
Bassett, R. A., South Muckleford	143
Beer, Mrs. E. V., Rainbow Lodge, South Kyneton	96
Bentley, F. W., Hastings-road, Frankston	1,080
Bingley, A., 333 Highbury-road, Burwood, E.13	213
Blyth Bros., Rowson-road, Bayswater	166
Christie, Messrs. R. R. and Son, St. Elmo Poultry Farm, Bentleigh	895
Clark, H. N., Bayswater-road, Croydon	2,262
Clegg, R. M., 52 Burns-street, Hamilton	55
Coats, C. J., Donald	70
Coupar, J. E., Nathalia	298
Davidson, A., 22 Sherbrooke-avenue, Ringwood	98
Dawson, R. G., Maldon-road, Castlemaine	504
Dimoline, W. and Son, Heatherton-road, Noble Park	407
Dookie Agricultural College, Dookie	389
Eastaugh, T. L., Point Nepean-road, Highett, S. 21	345
Eastman Bros., Messrs., 52 Landell's-road, Pascoe Vale, W.8	1,732
Emmott, J. T., Verdun-street, Inglewood	212
Evans, Mrs. R., 50 Simpson-street, Kyneton	50
Everard, H. L., Hawkesdale	422
Fitchett, C. W. Springvale-road, Tally Ho	548
Forbes, Mrs. R., Pental Island, c/o Swan Hill P.O.	294
Gartner, Miss M. T., 259 Middleboro-road, Box Hill	56
Giovanetti, G. E., Skene-street, Kennington, Bendigo	98
Goddard, Wm. J., 356 High-street, Bendigo	158
Graham, C., "All Black Poultry Farm," Portarlington	45
Grant, D., 6 Laurel-grove, Blackburn	63
Greenshields, E. J., Lancefield	431
Greenwood, J., Canterbury-road, Forest Hill	193
Gwyther, R. P., Valley-road, Highton, Geelong	348
Hall, R. H., Wal Wal	370
Hamblin, N. A., "Sunny Hill" Poultry Farm, Toolleen	1,441
Hamilton, A., "Lyncroft", Flinders	321
Hansen, Mrs. M. A., Katandra West	100
Hayes, R., Mt. Dandenong-road, Montrose	217
Hemphill, A. E., "Glenara Poultry Farm", Monegeeta	521
Henderson, C. W., Shepparton East	448
Hewett, A. T., Central-avenue, Bayswater	470
Hewitson and Phelan, "Golf House," Healesville	157
Hewitt's Poultry Farm, Skene-street, Bendigo	1,056
Hill, A. E., 26 Brenbeal-street, Balwyn	125
Hines Bros., Traynor's Lagoon, via St. Arnaud	970
Hockley, N. O., Coleraine-road, Hamilton	41
Howard, A. P., Brookvale, Kyneton	442
Hunt, R. R., 365 Highbury-road, Burwood, E. 13	821
Jackson, Messrs. C. and H. G., Cadles-road, Carrum Downs	300
Kosch, E. W., Coromby	397
Lawrie, Mrs. M., 107 Albert-street, Sebastopol	231
Lennie, Mrs. J. E., "Dumbarton," Mount Scobie, via Kyabram	225
Lucas, G., 4 Downing-street, Blackburn	923
MacKintosh, Walter C., Neerim South	365
Maclean, Charles C., Kelvinside-road, Noble Park	125
McDonald, J. L., Lyons-road, Croydon North	192
McLaughlin, K. A., Dandevue Poultry Farm, Bayswater	793
McLeod, Miss K., "Hayfield," Digger's Rest	93
Maher, Allan E., "Alandale", Wal Wal	772
Mead, J. L., 28 Golf Links-avenue, Oakleigh, S.E. 12	52
Meager, E., 12 Kennedy-street, Bendigo	21
Moller, F. C., Warburton-road, Lilydale	48
Molson, W. E., 188 Blackburn-road North, Blackburn	649
Moore, H. A., Warrandyte-road, Ringwood North	660
Mumford, L. J., Steele-street, Healesville	348
Mynott, J. B., Bridgeland Park Estate, Main-road, Eltham	102
Nemet, P., Spring Vale-road, Spring Vale South	1,107
Orange, Mrs. C., Marong	170
Poole, A., Hull-road, Mooroolbark	318
Poulton, A. W., Vickers-street, Sebastopol	1,077
Rae, J., 277 Albert-street, Sebastopol, Ballarat	720
Ridge and Son, 42 Myrtle-grove, Blackburn	1,056
Ridgway, Geo., Callander-road, Noble Park	155
Robbins, R. B., Derby	83
Rushton, J. A., 11 Barker-avenue, Shepparton	609
Salmond, J. B., Deer Park	120
Sanders, A., Stud-road, Wantirna	373
San Miguel, Mrs. M. H., Woodhouse-grove, Box Hill	2,253
Scouller, R. C., Tarrant-street, Cobden	243
Secar, W. "The Ranch," Station-street, Wesburn	195
Shipp, R., P.B., Kerang	492
Simpson, G. D., May-road, Glen Waverley	1,975
Skinner, Mrs. M. F., Princes-highway, Noble Park	76
Smith, E., Valley-road, Highton, Geelong	554
Smith, F., Lenham Poultry Farm, Terang	2,025
Spry, W. P., "Esswill", Culgoa	707
Stewart, J. A., Maldon-road, Castlemaine	777
Stiles Bros., "Fair View," Wallan	976
Sutcliffe, W., 71 Botanic-road, Warrnambool	104
Sutherland, J. M., Fulton-road, Box Hill	867
Sweeney, J. J., Tarara Stud Poultry Farm, 55 Rundle-street, Ararat	401
Taylor, E. D., Walker-street, Sebastopol	846
Travaglia, V., St. Arnaud Poultry Farm, St. Arnaud	876
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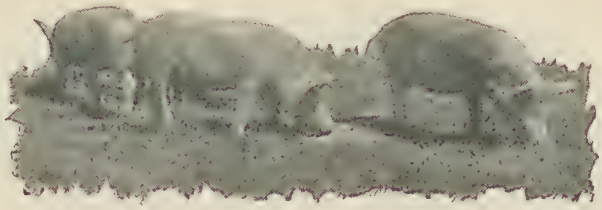

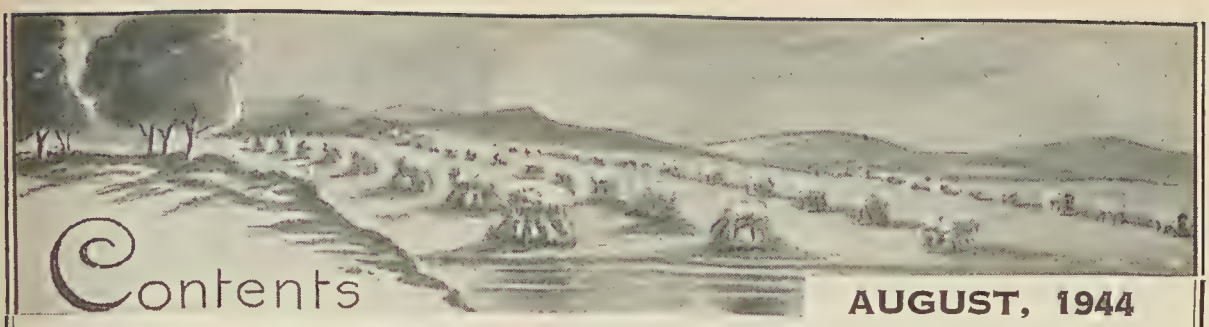

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Issued by direction of the Hon. N. A. Martin, M.L.A., Minister of Agriculture.

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POSTAGE RATES

The postage required for this issue is:—To Australia and New Zealand, 1½d.; to United Kingdom, 2½d.; to United Kingdom via All-sea Route, 1½d.; to other British Possessions, 2½d.; to U.S.A. and Foreign Countries, 3½d.

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Nitrate of Soda for Soil Fertility

A Valuable Fertilizer for Fruit and Vegetables

By G. W. GAYFORD, B.Agr.Sc., Horticultural Instructor

NITROGEN is one of the elements most necessary for the maintenance of growth and health in fruit and vegetable plants. Plants receiving insufficient nitrogen have small yellowish leaves and make poor stunted growth. Obviously then, a high level of soil nitrogen is particularly necessary for leafy vegetable crops such as cauliflowers, cabbages, Brussels sprouts, silver beet, lettuce, &c. Leguminous vegetable crops, such as peas and beans, are less dependent upon soil nitrogen because of the association of rhyzobium bacteria within the roots of these plants. These bacteria are capable of transforming atmospheric nitrogen into a plant food.

Fruit trees require adequate supplies of nitrogen, especially at blossoming time, in order that the flowers will set and the trees will carry a satisfactory percentage of the fruit through to maturity. Citrus trees probably are affected most by nitrogen deficiency, which is shown, not only by the poor leaf colour, but by the extensive shedding of young fruit after blossoming.

The amount of soil nitrogen available to plants depends largely on the activity of soil organisms, and the number of these varies according to the amount of organic matter in the soil. Under the conditions of cultivation necessary for the growing of fruit and vegetable crops, the original humus and nitrogen content of the soil is greatly reduced. Frequent summer cultivation results in a loss of organic matter and a consequent loss of nitrogen. Under irrigation, nitrates are lost by leaching, but probably the largest cause of loss is the continuous removal by plants.

It is necessary, therefore, to replenish soil organic matter by growing green manure crops or applying large quantities of farmyard manures. These materials also replace

some of the nitrogen, but it is impossible in most districts to grow green crops of sufficient bulk to supply enough nitrogen for the market crop, and consequently it is necessary to add nitrogen in the form of an artificial fertilizer.

Sources of Artificial Nitrogen

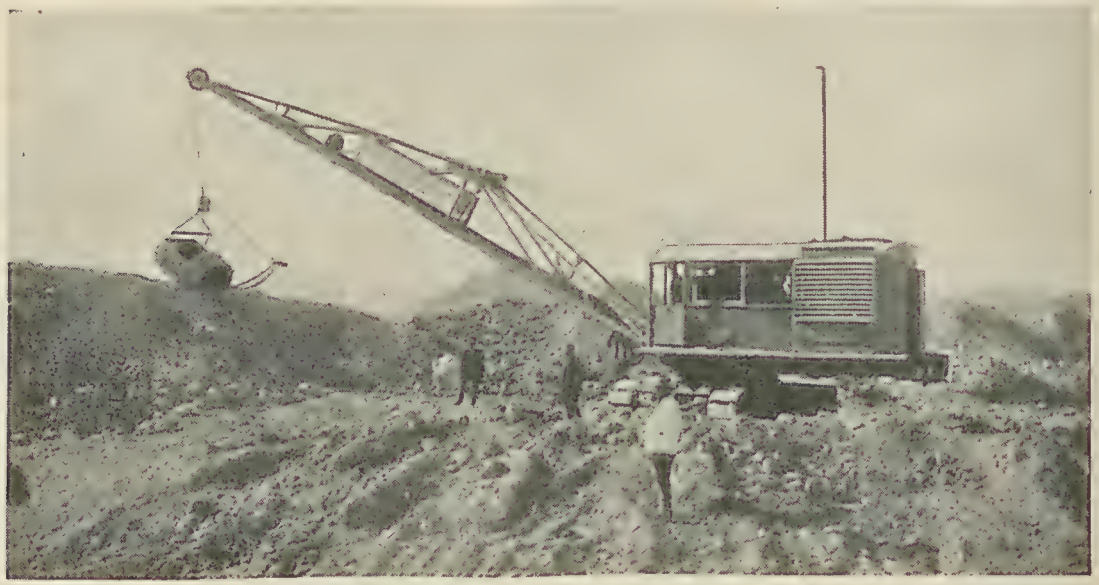
Sulphate of ammonia was chiefly used as a source of nitrogen, but this fertilizer is now in short supply and must be reserved for use on vegetable, potato, and citrus fruit crops, which are in urgent demand for defence and civil needs. Fortunately for fruit and vegetable growers, it has been possible to secure imports of nitrate of soda, a nitrogenous fertilizer of similar value to sulphate of ammonia. Nitrate of soda may be used under conditions similar to those in which sulphate of ammonia is used, on all soils except those in the Murray Valley irrigation areas west of Echuca. On the alkaline soils in these areas, nitrate of soda cannot be used continuously, because it will increase alkalinity and result in the clays becoming sticky and difficult to irrigate and cultivate. However, nitrate of soda may be used in moderate amounts for one or two years even on these soils without adverse effects, unless, of course, signs of excess alkalinity are already showing.

As a plant food, nitrogen must be in the form of nitrate before it can be absorbed by the roots. Various processes in the soil, chiefly bacterial, are necessary before the nitrogen in such fertilizers as blood and bone, blood manure, or farmyard manure becomes available, hence these fertilizers are relatively slow in action.

The ammonia in sulphate of ammonia must also be converted to nitrate before it becomes available to plants, and this process takes some time, although considerably less than in the case of blood manure, &c. In the summer it may take approximately a week, but in the winter the process is much slower. Nitrate of soda, however, supplies nitrogen in readily available form, and is of special value where plants are in need of nitrogen during the winter and early spring, a period of the year when soil nitrification is practically nil.

The ammonia in sulphate of ammonia is held in the surface layers of soil by the clay particles, and hence is resistant to leaching. Nitrate, however, is highly soluble, and care should be exercised in applying nitrate of soda, particularly under irrigation where quantities in excess of the plants' requirements may be lost by leaching. This loss is most extensive in light sandy soils.

Nitrate of soda contains 15·5 per cent. nitrogen, compared with 20·6 per cent. in sulphate of ammonia. However, this difference is probably not very important, because the nitrogen in nitrate of soda can be used more efficiently by the plants. The common belief that nitrate of soda is merely a stimulant is entirely without justification.



Excavating crude nitrate of soda, Chile.

Used in the right way, this material serves the same purpose as any other nitrogenous fertilizer.

Because of its ready solubility, nitrate of soda will quickly penetrate the soil to the root zone under irrigation or rainfall, therefore the method of application is not important. By broadcasting on the green manure crop before ploughing it will promote the decomposition of this crop. Care should be taken to prevent uneven distribution, and two or three small applications are preferable to one large one.

Nitrate of soda is not suitable for use in mixed fertilizers unless the fertilizer is to be used at once.

Time and Rate of Applications

The following are recommendations for various crops. The ration should be applied for the most profitable purpose, i.e., on the most commercial varieties of fruit trees, or on that section showing most need of nitrogen.

Deciduous Fruits.

Apply 2 lb. per tree in the spring before blossoming, followed by a further application of 2 lb. a month later.

Citrus.

2 lb. per tree in September, followed by further applications at monthly intervals during the summer, making a total application of 8 lb. per tree.

Berry Fruits.

2 cwt. per acre in the spring, followed by a further 2 cwt. a month later.

Vegetables.

Nitrate of soda is an excellent fertilizer for side dressing vegetable crops, including cabbage, cauliflower, spinach, silver beet, lettuce, tomatoes, and early onions, after the plants are eight weeks old.

Single applications of nitrate of soda should not exceed 2 cwt. per acre.

Increased Ration Available

The ration of nitrate of soda for fruit growers this season will be 50 per cent. greater than last year's quota. Nitrate of soda is a suitable fertilizer to supply the nitrogen requirements of fruit trees and vines, and is most valuable when applied in the early spring.

The limited stocks of sulphate of ammonia are being reserved for the priority crops—vegetables, potatoes, and citrus fruits in the northern irrigation areas. Animal fertilizers, such as blood and bone, also are in short supply, and will be reserved for vegetables. Mixed fertilizers, such as mixtures of superphosphate and sulphate of ammonia, are not available for fruit growing.

The ration of nitrate of soda for fruit trees, vines, and berries has been increased to 3 cwt. per acre, and for citrus trees in the southern areas up to 6 cwt. per acre.

Growers who procured nitrate of soda last season may obtain their increased allotment this year from the same supplier. No application form is necessary. Those who did not receive any nitrate of soda last year must apply for their allotment on a special form, copies of which are available from the fertilizer agents or from the Fertilizer Section, Department of Agriculture, 81 Collins-street, Melbourne. Growers who did not order the full amount of nitrate of soda to which they were entitled last season and who require their full supply this year must lodge a fresh application form with the same supplier.

Citrus growers in the northern irrigation areas may now obtain a ration of 4 cwt. per acre of sulphate of ammonia for their registered citrus area, and, in addition, they may receive up to 3 cwt. per acre of nitrate of soda.

Dried vine and irrigated citrus growers must order their fertilizer from the packing company or agency with which they are registered for fertilizer supplies.

Orchardists are urged to lodge their orders and take delivery of their fertilizer without delay, so that it will be on hand when required.

Warning

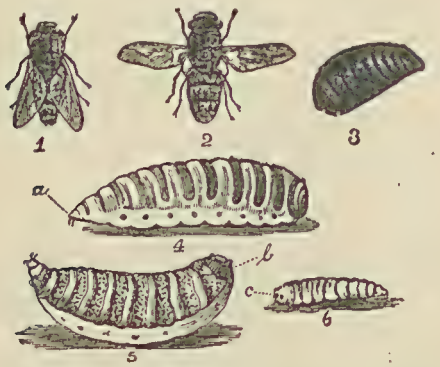
The presence of nitrate of soda on any combustible material greatly increases its inflammability. Empty bags should not be left in wooden sheds unless they have first been shaken out, thoroughly washed, and dried. Do not allow matches or cigarettes to come in contact with empty bags.

The Sheep Nasal Bot

Compiled by the Veterinary Staff

THE sheep nasal blot is the larval or grub stage of the sheep bot-fly (*Oestrus ovis*), which is a yellowish-grey hairy fly somewhat smaller than the common blowfly. It is rare for one of these to be seen when active, since it is an exceedingly fast and noiseless flier.

In the heat of the day during the summer and autumn months, the fertilized female fly deposits small larvae or grubs one-twelfth of an inch long on and around the nostrils of sheep. In the presence of the fly the sheep become uneasy and attempt to protect themselves by milling round and pushing their heads against other sheep or into herbage or loose ground. During an actual attack a sheep will rub its nose along the ground and endeavour to keep the fly from striking by shaking its head and brushing at its nose with its fore feet.



1 and 2—Adult Fly (*natural size*). 3—Pupa. 4—Full-grown Larva, dorsal view (*enlarged*). 5—Same, vertical view. 6—Young Larva.

Once the grubs are deposited at the nostrils, they make their way, aided by two small hooks, up the nose until they ultimately become located in the upper nasal passages and the air cavities of the face, where they attach themselves to the lining membrane. In these positions they grow until fully developed, when they are about four-fifths of an inch long and one-third of an inch in width (that is, slightly larger than the horse bot). The young larvae are white and, as they develop, they become yellow or brown, the eleven segments showing up distinctly. The head end has two hooked appendages and the tail end two breathing pores.

In the spring time, after a period of about ten months, the grubs leave the air cavities and pass into the nose from which they are expelled by sneezing; they then burrow into the soil, where a change in development, known as the pupal stage, takes place. Further development results in the formation of the adult fly, which emerges in from one to two months' time; fertilization of the female takes place and the life cycle proceeds once more.

Sometimes the grubs reach parts of the head from which they are unable to escape when fully grown, and when this happens they die, and are then seen occasionally when a sheep's head is split open.

Symptoms

The presence of these parasites in the nasal passages and in air spaces of the head sets up an irritation of the lining membrane, causing a nasal discharge with consequent snuffling and sneezing; such condition is often referred to as "snotty nose."

A percentage of sheep infested will become affected in general health. The irritation set up, with its consequent sneezing, does not allow the sheep to thrive. It is also possible that, by the puncturing of the membrane by two small hooks of the young bots as they progress along the nasal passages, disease-producing microbes may gain access to the system.

Prevention

Actual treatment of affected sheep is rarely necessary, but there are certain preventive measures that are practised. Shelter trees and plantations should be provided in all paddocks. The ploughing of furrows across the paddocks when the flies are active provides a small bank of soft earth into which the sheep may push their noses.

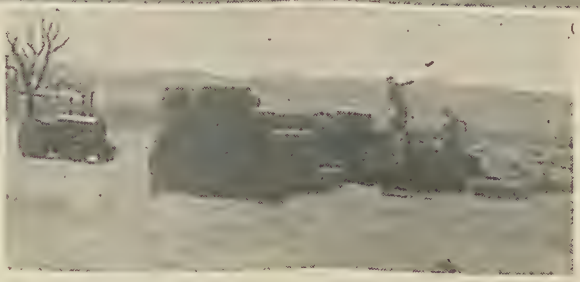
Finally, smearing the noses with a preparation, such as Stockholm tar or Boro-glycerin, is recommended for small valuable flocks. It is advisable to apply the preparation by hand the first time, then to use a covered lick trough in the top of which are several 2-in. holes. The preparation is placed around the edges of the holes, and when sheep use the trough the material is smeared around their noses.

War Agricultural Committee Notes

Compiled by The Central Executive

Group Mechanization of Dairy Farms

DAIRY produce has now become the number one priority foodstuff, and mechanization of the many branches of the dairying industry must necessarily receive careful consideration. Of all the various branches of farming, none lends itself more readily to "Group Mechanization" than the cultivation and harvesting work of the dairy farm. Group mechanization can help the dairy farmer considerably, by saving him work, manpower, and money—and it can increase production and income. That is the objective of the scheme.



Conservation of fodder in the spring will increase dairy production in the autumn and winter.

To increase dairy production, it is necessary to sow down fodder crops and improve pastures quickly to provide home-grown fodder for the leaner seasons. This will mean more work, and consequently more manpower. Can it be done? The answer is "Let us try." It is surprising what can be done when interested parties really try to solve a problem—but the parties must be interested! The problem must be attacked with enthusiasm and optimism, if a successful solution is to be reached.

The most practical plan for putting the scheme into operation is for contractors in dairying areas to purchase modern machinery under the Assisted Purchase Plan formulated by the Victorian Department of Agriculture and the Commonwealth Government. The contractors will undertake dairy farmers' cultivation and hay-pressing work at district contract rates mutually agreed upon between the contractor and the local War Agricultural Committee. The contractor will agree to work under the direction of the Local War Agricultural Committee, which will approve rates reasonable to the parties concerned and adjudicate on any contentious matters arising between the parties. In areas where private contractors cannot be established, farmers may form their own group, so long as one individual undertakes responsibility for the care and operation of the equipment. In cases where a farmer is controlling an area large enough to utilize equipment to capacity on his own work, or that of share farmers, he may acquire the necessary machinery under the Assisted Purchases Plan, provided he undertakes to use the machinery to improve pastures, grow fodder crops and conserve stocks of fodder in the interests of dairying.

The foregoing is a broad outline of the plan suggested. Contract rates must be fair and reasonable to both parties, but are not likely to be less than rates already ruling in the district. Rates for all varying classes of work will be subject to the general approval of the War Agricultural Committees. It may be

found desirable to zone contractors to definite areas, and eliminate competition and uneconomic transport of machinery and labour within the prescribed areas. Such a plan will be truly co-operative. The number of contractors established in any district will be governed by the capacity of the mechanized equipment to carry out the work required within a known period.

In estimating the capacity of equipment and manpower provided by the contractor, it will be advisable to work on a conservative basis and to allow the plan to develop according to the demand. It is suggested that preparation of the land for sowing of fodder crops and the harvesting and pressing of these crops and of meadow hay constitutes one of the first jobs that might be carried out under the Group Mechanization plan.

Preparation for sowing can be carried out during the autumn season after the first good rains have fallen, to permit ploughing or discing. Normally, in most dairying areas in Victoria, oats may be sown early enough to provide green feed to be eaten off before the spring. Later ploughing and sowing could be carried through till August.

It must be understood that these statements are made in a general sense to cover the dairying areas of Victoria as a whole, and particular districts would necessarily adjust dates to suit their particular conditions.

From the foregoing, it can be estimated that if a contractor is to do only the ploughing or discing for fodder crops (and the farmer does his own sowing), the contractor would have an operational period from March till August, with approximately 95 actual working days. If he averages 10 acres a day in good country the equipment should cover on the average 600 acres, with due allowances for difficult country. On the basis of these figures, a contractor could not service more than 30 farms averaging 20 acres each for fodder, for the ploughing alone. If he undertook the sowing as well as the ploughing, the figure would have to be reduced by, say, 25 per cent., and would work out at 450 to 500 acres each year.

The machinery required by the contractor at the outset, would include a good strong-powered rubber-tyred tractor, of not less than 22 horse-power at the drawbar, capable of handling a five-furrow or six-furrow mouldboard plough or fair sized one-way disc cultivator in most classes of country.

The harvesting machinery would constitute a binder or mower, side delivery hay rake, and suitable hay press, which would operate from November till January in most dairying districts in this State.

The seasonal capacity of a hay-baling press is 800 to 1,000 tons over a twelve weeks' period, baling at the rate of approximately 85 tons weekly, with an 18-in. x 14-in. or 18-in. x 16-in. press. Some presses actually have a greater capacity than 85 tons weekly, but transporting and moving around paddocks and setting up occupy time, and it will be found that operational work averages around 85 tons per week.

As far as can be ascertained at present, the average charge for contract pressing last season, with eight men employed, was between 16s. and 22s. 6d. per ton in most districts, plus keep value of 3s. 4d. per ton. Some contractors charged 16s. 6d. per ton plus wire and keep, but in such cases, owners had to sweep hay and stack in bundles. This latter method will probably become necessary in some areas while the arrival of the press is awaited, and to ensure meadow hay being cut at the right moment and not being permitted to over ripen and lose value.

This article should give those concerned in utilizing and arranging Group Mechanization plans a general idea of the capacity of main equipment, and assist in avoiding applications for machines that cannot be profitably employed by a contractor. It will be seen that a good contractor can undertake the main fundamentals of a dairy farmer's cultivation and harvesting, but the intermediate jobs will still need to be carried out by the farmer himself.

Group mechanization for main essentials should prove a boon to dairy farmers by eliminating the necessity for the individual to possess expensive machines for personal use in a very limited capacity. It will allow farmers to use capital for other necessary improvements and installations. It is to be hoped that many of the managements of butter factories will become interested in the contracting schemes as a valuable service to suppliers, as such factories are vitally interested in increasing carrying capacity and milk production in their respective districts. This scheme should help the dairy farmer to overcome man-power shortages on the farm and give him more time to attend to his calves, to his pigs, and to other routine jobs of dairying.

WORMS IN SHEEP

By S. A. MOUNTJOY, L.V.Sc., Veterinary Officer

OF all the domestic animals, sheep are the most subject to serious infestations with animal parasites such as worms, and it not infrequently happens that heavy mortality directly attributable to internal parasites may occur in flocks. Even when there is no mortality, the presence of worms may mean great economic loss to the sheep-raiser, for infested sheep usually are reduced in condition, and their fleeces are appreciably lighter than those of healthy sheep.

Healthy, well nourished, adult animals exhibit a marked natural resistance to worm infestation. During early life this resistance is not developed to a great extent, so that the more serious effects of worms are frequently seen amongst lambs and young sheep (weaners). When exposed to infestation, animals which are experiencing a drain on their vitality such as pregnant or nursing ewes, and ill-nourished sheep show a lowered resistance to the harmful effects of internal parasites.

The onset and also the duration of symptoms are largely determined by dietetic conditions. Worms usually occur amongst sheep which have access to swampy lands or heavy pastures which remain damp for long periods, although these conditions are not essential. Old pastures, especially those that have been overstocked, are particularly dangerous on account of the gross contamination due to the accumulation of young immature worms.

STOMACH WORMS

Stomach worms are found in the fourth stomach, and there are three forms of importance in Victoria—(1) *Haemonchus contortus*, (2) *Ostertagia circumcincta*, and (3) *Trichostrongyles axei*.

Stomach Worm.
(*Haemonchus contortus.*)
A—Male. B—Female. C—Egg.

Haemonchus contortus.—The large stomach worm, barber's pole or wire worm, is a blood sucking round worm measuring from ¾ inch to 1¼ inches in length. The male is bright red and the female striped red and white. If the fourth stomach of an affected sheep be opened immediately after death, these worms will be seen wriggling actively in the stomach contents. On exposure to the air, however, their motility soon ceases.

As a rule this worm is not of great

The lesser stomach worm (*natural size*).
(*Ostertagia circumcinta*)
[Q'land Dept. Agric.

importance in Victoria, but severe losses from *Haemonchosis* do occur at times.

Life History.—The mature female lays a large number of eggs, which are passed out in the dung. Freezing or desiccation will kill the eggs, but, if the temperature be favorable, they soon hatch out. The immature worms, when hatched increase in size, undergo two changes in structure, and eventually crawl on to a blade of grass, where they remain dormant until eaten by a sheep, in the stomach of which they attain maturity in three weeks.

The resistance of the young worms, before being eaten by sheep, is very great. They can stand the cold of winter without suffering any harm, and if conditions are favorable may remain alive on pastures for about ten months.

Ostertagia circumcincta. — The medium stomach or brown hair worm. This species is brown in colour and about ½ inch in length.

Life History.—Until eaten by a sheep, the life history of these worms is similar to that of *Haemonchus contortus.* After ingestion, however, part of their development takes place in the wall of the fourth stomach where they form small nodular areas. After leaving the nodules, development is completed in the mucous membranes, the female reaching maturity in fifteen days.

Trichostrongyles axei.—This is a very fine pale pink worm from ¼ to ⅓ of an inch in length.

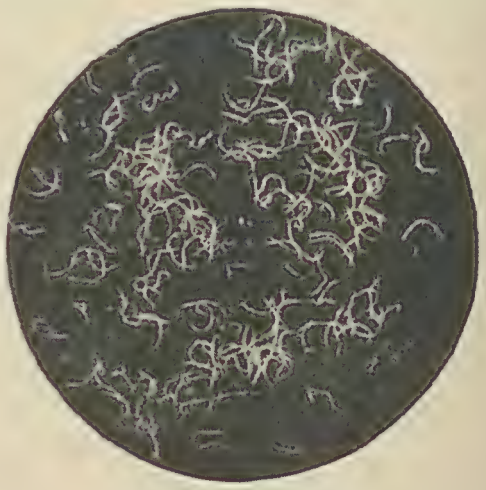
INTESTINAL WORMS

Intestinal worms consist of two types—round worms and tapeworms.

Round Worms.—By far the most serious effects from worms are caused by several species of the genus *Trichostrongylus* and related forms, and the disease they cause is known as trychostrongylosis or black scours. They are commonly called the "small intestinal worms." These small worms are ¼ to ⅓ of an inch long, pale pink in colour, and difficult to see. One species (previously mentioned) is found in the fourth stomach, but the other species should be looked for in the first 10 feet of the small intestine. To detect these small worms scrape the inner surface of the fourth stomach or small intestine with a knife, place the scrapings thinly between two pieces of clear glass, and hold up to the light, when they may be seen as small hair-like structures.

Nematodirus species are found in the small intestines, being most numerous (when present) from the sixth to the twentieth foot. They may be up to 1 inch in length, and are creamy to bright pink in colour.

In the large intestines occur two species of *Oesophagostamum. Oesophagostamum columbianum,* a white, fairly thick worm, from ½ inch to 1 inch in length, causes a nodular disease of the intestine, known to butchers as "Pimply Gut." The young or larval worms on reaching the intestine bore into the wall and cause small shot-like nodules. They eventually leave the nodules to become mature in the lumen of the bowel. They are most



Hair worms (*natural size*).
(*Trichostrongyles spp.*)
[Q'sland Dept. Agric.

commonly found in the large bowel, but may be found throughout the intestinal tract.

Another species, *Oesophagostamum verulosum,* is not associated with the formation of intestinal nodules during its development, but it is now considered that the adult forms of this parasite are extremely harmful. The former species has never become established in Victoria.

Other round worms found in the large bowel of sheep are *Chabertia ovina* and *Trichuris ovis.* Both of these are quite easily seen. *Chabertia ovina* is a stout white worm, which is usually found adhering to the bowel lining. *Trichuris ovis,* the whip-worm, so called because of its resemblance to a stock-whip, is white in colour, and when stretched measures up to 3 inches in length. It is found in the caecum and large intestines. These two varieties are rarely associated with disease in sheep.

Tapeworms.—There are two tapeworms of importance found in the small intestines of sheep in Australia, viz., *Monieza benedini* and *Monieza expansa.* These are long, yellowish-white, ribbon-shaped, segmented worms, measuring up to 18 feet in length.

When ripe, the end segments, which are filled with eggs, drop off, and are passed out with the droppings, and serve as an indication of the presence of the infection.

Probably on account of their size, these worms are usually blamed by sheep owners for serious trouble in sheep, but investigation invariably shows that it is caused by the much more important parasites, viz., stomach and small intestinal worms (trichostrongyles).

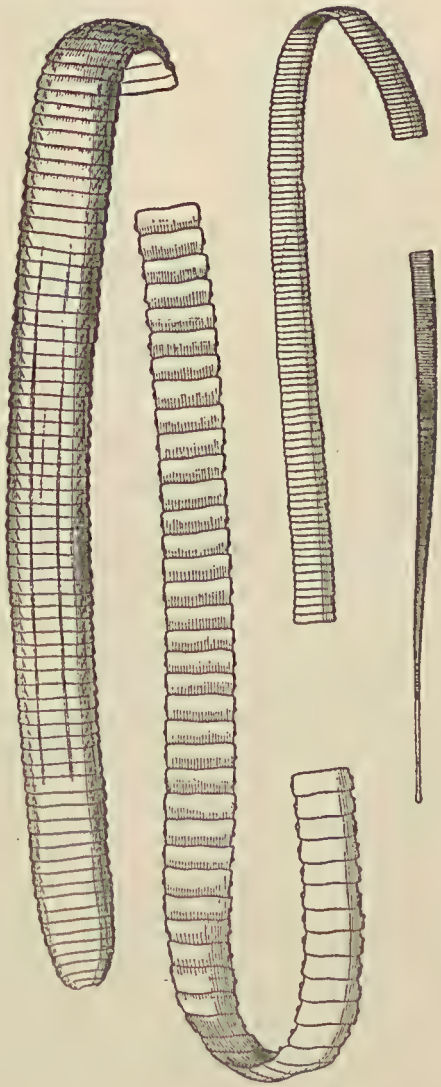
Symptoms of Infestations

In some cases no serious symptoms are noticed for some time. Usually the first symptoms seen are that the animals appear less lively, lose condition, and remain stunted in development. If examined, the membranes of the eyes and mouth will be seen to be paler than normal. Later on, diarrhoea sets in, and swellings may appear below the jaws. The animals become extremely emaciated, and the mortality may be heavy.

For correct diagnosis it is suggested that all the internal organs from an affected sheep be forwarded by rail to Spencer-street and addressed to the Veterinary Research Institute, Story-street, Parkville. Cut ends should be tied securely, and the organs placed in a kerosene or petrol tin and covered with formalin solution (1 cupful to 2 gallons of water). The tin should be soldered down. The Director of the Institute should be notified of the despatch of the specimens.

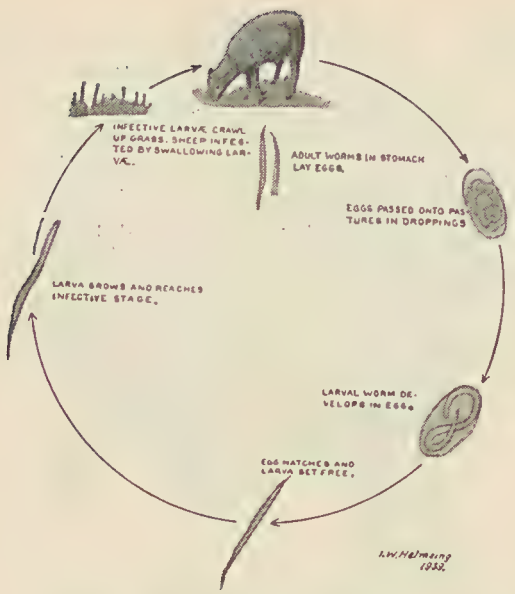
Treatment

A combination of copper sulphate and nicotine sulphate (40 per cent.) in water is highly effective against the large stomach worm (*Haemonchus contortus*), and is practically a specific for tapeworms. Good results



Tapeworms (*natural size*).
(*Monieza expansa.*)

[Reproduced from *A Treatise on the Parasites and Parasitic Diseases of the Domesticated Animals,* by L. G. Neumann.


INFECTIVE LARVÆ CRAWL UP GRASS. SHEEP INFESTED BY SWALLOWING LARVÆ.
ADULT WORMS IN STOMACH LAY EGGS.
EGGS PASSED ONTO PASTURES IN DROPPINGS
LARVA GROWS AND REACHES INFECTIVE STAGE.
LARVAL WORM DEVELOPS IN EGGS
EGG HATCHES AND LARVA SET FREE.
A.W. Helming 1932.

Showing how sheep become infested with round worms.

[Q'land Dept. Agric.

also are obtained against the medium stomach worm (Ostertagia) and Nematodirus with this combination.

Treatment for trichostrongylosis is not so satisfactory, but work conducted by the Council for Scientific and Industrial Research has shown that by far the best results are obtained when sheep are regularly treated with the copper sulphate and nicotine sulphate combination. Treatment should be carried out not only to cure affected sheep, but also to reduce the amount of infestation from year to year.

As mentioned in the life histories of the various worms, infestation takes place through sheep eating grass on which the immature forms of the worms are encysted. Sheep, when returned to pasture after dosing, may thus be re-infested, especially during the spring and summer months.

Lambs, weaners and lambing ewes are more liable to suffer harmful effects from an infestation, and efforts should be made to prevent this by carrying out treatment with copper sulphate and nicotine sulphate every three or four weeks through the spring, summer, and autumn months. Dosing should be commenced as soon as the grass begins to grow. By this method numbers of young worms are destroyed before they can lay eggs to re-infest the pasture. Starvation prior to drenching is not necessary.

Preparing the Solution.

Use porcelain or enamelware utensils in preparing and administering the solution, as the copper sulphate will corrode ordinary metal utensils.

Make up a stock solution as follows:—

Dissolve 2 oz. of copper sulphate (bluestone) in ½ pint of boiling water, then add enough cold water to make a total of 1 gallon (160 oz.). To this add 2 oz. of nicotine sulphate 40 per cent. (Black leaf 40). In dissolving the copper sulphate, all white or powdery lumps should be discarded, and only hard blue lumps used.

The doses suggested are—

For adult sheep—2 oz. (4 tablespoonfuls).
Sheep 6 to 12 months old—1½ oz. + ½ oz. water.
Lambs 3 to 6 months old—1 oz.
Lambs under 3 months—½ oz. + ½ oz. water.

For smaller doses than 2 oz. alter the above stock solution as follows:—Dissolve 4 oz. of copper sulphate in 1 gallon of water and add 4 oz. of nicotine sulphate. The doses of this mixture then are:—

For adult sheep—1 oz. or 30 c.c.
For sheep 6 to 12 months old—¾ oz. + ¼ oz. of water.
For lambs 3 to 6 months old—½ oz. + ½ oz. of water.
For lambs under 3 months—¼ oz. + ¾ oz. of water.

Repeat the dose twice at ten-day intervals and then every three weeks if the animals are still exhibiting symptoms of worm infestation.

Special brass or copper drenching horns which hold the exact dose, may be procured for administering the drench. Drenchings guns of suitable material are also available. When drenching, care should be taken so that the membranes of the mouth are not injured. The sheep should be drenched standing on all four feet, and the nose held about level with the eyes. Hold the head in position with the left hand, with the four fingers under the jaw and the thumb over the nose. The jaws should not be gripped tightly.

Place the drenching horn through the side of the animal's mouth, over the tongue, and between the back teeth, and pour the dose in slowly. The head should be lowered immediately if the sheep begins to cough. After treatment the animals should be put on to

fresh pasture. Hand feeding with grain such as oats is very beneficial. This is particularly necessary for the "tail" of the flock which should be drafted off and fed separately.

Phenothiazine

It has been found in practice that on occasions a percentage of the flock comprising the tail, does not respond to drenching with copper sulphate and nicotine sulphate. In such cases the use of the drug phenothiazine is advised. This drug is a greyish powder, insoluble in water. It usually has added to it a wetting agent, which enables it to be mixed with water to form a suspension suitable for drenching. The drug is obtainable in Victoria under the trade names of "Phenovis" and "Phenzeen".

It is very efficient for treatment against the large Stomach Worm or Barber's Pole Worm (*Haemonchus*), Nodule Worm (*Oesophagostomum columbianum*), Small Intestinal worm or Black Scour worm (*Trichostrongylus*) and the small brown Stomach Worm (*Ostertagia*). It is *not* effective against tapeworms.

One limiting factor against the general use of phenothiazine is its greater price when compared with copper sulphate and nicotine sulphate. This, however, is offset by its greater efficiency, and to some extent it is also governed by the very short supply of nicotine sulphate.

Directions for the use of the drugs are supplied with the preparations. The dosage rate recommended is:—Lambs, ¾ oz.; adult sheep, 1 oz.

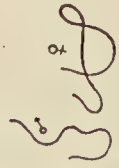
During administration, care must be taken to avoid spilling the mixture as phenothiazine will stain wool. An hour of two after drenching, the urine becomes a reddish-brown colour, and this continues for four to five days. In order to avoid staining from this source, sheep should not be crowded together after drenching, but should be placed in a large yard and returned to the paddock as soon as possible.

LUNG AND BRONCHIAL WORMS

Lung worm disease is fairly common in this State. The disease may appear in a flock at any time, but usually it occurs from early spring to late autumn. It is common in low-lying, marshy districts of high rainfall and in areas subject to flooding. Mortalities may occur from heavy infestations with lung worms, but in most cases where these parasites are blamed the actual causes of death are the previously mentioned stomach and small intestinal worms. Some varieties of these are invariably present.

The more important in Victoria are—The *Bronchial Worm* (*Dictyocaulus filaria*) and the *Small Lung Worm* (*Muellerius capillaris*). The latter is a fine, hair-like, brownish-red worm about ¾ inch to 1¼ inches in length. It is found in the finest air passages and its presence is indicated by raised greyish nodular areas in the lungs.

Dictyocaulus filaria, the large lung worm or bronchial worm, is a white, hair-like worm, from 1½ inches to 4½ inches in length, and is found packed in the smaller bronchioles at the base of the lung. It may also be present in the larger air passages.



The bronchial worm. (*Dictyocaulus filaria.*) A—Male. B—Female.

The lung worm. (*Muellerius capillaris.*) Male and Female.

(Natural size.)

[Reproduced from *A Treatise on the Parasites and Parasitic Diseases of Domesticated Animals*, by L. G. Neumann.

Life History.—The life history of this worm is as follows:—

The female lays eggs, each containing an embryo, in the air passage. These are coughed up and normally are swallowed. Hatching in the bowels, they are passed out with the droppings. On the ground they undergo changes in structure, and then crawl on to the grass, where they remain more or less resistant. They are eaten by the sheep, particularly when grazing over shallow, marshy areas, or may be swallowed in the drinking water. After being swallowed they bore into

the bowel wall and into the lymph stream and pass to the heart. From the heart they are carried in the blood to the lungs passing through the walls of the alveoli into the air passages where they reach the adult stage.

The life history of the lung worm (*Muellerius capillaris*) differs from that of *Dictyocaulus filaria* in that the larval stage is passed in the bodies of certain snails.

Symptoms

The disease develops as an insidious bronchitis which may develop into pneumonia. The first thing noticed is a cough, which at the start occurs only in a few animals; it is short, dry, and strong. Gradually most of the flock will be noticed to be affected with this cough. As the disease progresses the cough becomes more frequent, but weaker. The bronchial secretions are expelled through the mouth in lumps. There is also a mucus discharge from the nostrils. Breathing becomes more and more difficult. The sheep become emaciated and the membranes of the eyes, nostrils, and mouth become pale. After a period of from about two to four months deaths may occur from exhaustion. The diarrhoea which is often present is due to stomach and small intestinal worms.

Treatment

Treatment of lung worm disease is rather unsatisfactory, and in most cases good food and care probably will give better results than medicinal treatment. As stomach and intestinal worms are invariable present, drenching with copper sulphate and nicotine sulphate (as previously described) should be carried out to destroy these parasites, thus enabling the sheep to withstand better the effects of the lung worm invasion.

Remove the animals from the source of infestation and, if possible, put them on better pasture. If this cannot be done hand feeding should be resorted to, to build up the condition of the sheep. In the case of valuable stud sheep, intratracheal injections may be tried, but as this treatment requires skill it should be carried out only under the supervision of a qualified veterinarian.

Prevention of Worm Infestation

1. Adequate nutrition is particularly important. Sheep in good, strong, healthy condition can withstand the effects of a worm infestation, even though they may be harbouring hundreds of worms, whereas those in low weak condition are unable to withstand these ill-effects, and mortality amongst the latter may be heavy.

Lambs and weaners (until they are at least twelve months old) should not be allowed to suffer any check in their growth. To prevent any such check hand feeding should commence before the pastures decline in food value. Oats, ¼ to ½ lb. per head per day, is a very good concentrate, though other grains, such as wheat, barley, or maize, and/or meadow hay and lucerne hay may be used.

2. After medicinal treatment, sheep should be moved to fresh pasture and, if possible, the paddock just vacated should be left free of sheep for twelve months, during which time it may be cultivated with advantage. Where this is not possible, frequent changes of pasture will be of assistance.

3. Over-stocking and close grazing should be avoided. The more worm-infested sheep graze over a particular pasture, the greater will be the amount of contamination with eggs and young worms. Sheep grazing close to the ground pick up a larger number of immature worms than those on longer pasture.

4. All dams and watering places should be fenced off, and troughing supplied for stock to drink from. Troughs should be cleaned regularly.

5. Low-lying swampy pastures should be drained.

6. A burning off of worm infested pasture is one of the best means of destroying the young worms, and should be carried out where practicable. Care should be taken, however, not to prevent seeding of pastures.

Reference

Clunies Ross and Gordon.—The Internal Parasites of Sheep.

DRUGS ON THE FARM

G. NICOL, B.V.Sc., Veterinary Officer

THE provision of a small number of drugs on the farm can be of inestimable value.

A first-aid cabinet should be constructed with adequate shelf spacing and all drugs should be properly labelled so that no confusion will occur as a result of indecipherable labels. A list of useful drugs which might well be included is as follows:—

Boric acid.—In the form of a 4 per cent. solution Boric acid is a useful medicament for conditions such as ophthalmia ("pink-eye") of sheep and cattle. It may be used alone or in combination with a 2 per cent. zinc sulphate solution.

Argyrol.—A 10 per cent. solution of Argyrol is non-irritant to delicate structures such as the eye, so that it finds common use in conditions affecting or adjacent to the eye where the use of any corrosive disinfectant may result in permanent damage to the eye.

Acriflavine.—Used in concentrations varying from 1 in 1,000 to 1 in 10,000, Acriflavine is a useful skin disinfectant, being particularly well suited to the dressing of surface skin wounds.

Tannic Acid.—Very often used in the treatment of burns in animals, tannic acid depends for its action on the coagulation of protein in the surface layers of the skin to form a protective coating to exclude air.

Sodium bicarbonate is useful for correction of acidity of the vagina in cattle, being used as a 2 per cent. solution prior to service.

Zinc sulphocarbolate has found extensive use in conditions such as vaginitis, being used as a 1 in 500 solution in warm water.

Calcium borogluconate should always be included. Dissolved in sterile water (boiled water allowed to cool), it is particularly effective, when injected subcutaneously or intravenously, against milk fever in cattle and hypocalcaemia in ewes. Absorption of the injected fluid results in a rapid rise in the calcium content of the blood stream. The borogluconate may be obtained in 2½-oz. packets, and is readily soluble in water. Its use in milk fever is much to be preferred to inflation of the udder.

Ointments and blisters.—These are readily procurable from any chemist. One feature about the general use of ointments which is not generally appreciated is that usually they do not contain strong germicides but depend on their bland and protective action which aids healing. The procedure on some dairy farms of keeping large tins of vaseline and other ointments exposed is very bad practice and doubtless is responsible for the transmission of many cases of mastitis and teat sores. The accumulation of dust, &c., in these exposed ointments does not appear to deter owners from using them. Any ointment used should be kept in very small tins fitted with a lid. On treating any infected cases the hands should be washed before using the ointment again. In this way only can the ointment be kept free of infection. Any infection introduced from mastitis or cow pox cases will often persist in contaminated ointment for long periods. Any contaminated ointment should be discarded.

Sodium hypochlorite.—Sodium hypochlorite owes its effective germicidal action to the liberation of free chlorine; it is a particularly useful disinfectant, being suitable in dilute solutions for sterilizing teats. For full details as to its use the reader is referred to the Mastitis Investigation Committee's pamphlet on The Limitation or Control of the Spread of Mastitis in Dairy Herds. Copies of this report are obtainable, post free, on application to the Department of Agriculture, Melbourne.

Sodium carbonate (washing soda) is useful for removing grease from milking cups and from the floors of milking sheds.

Carbon tetrachloride is particularly effective in combination with liquid paraffin as a drench against liver fluke. Pamphlets on its use in this connexion are available, free of charge, from the Department of Agriculture, Melbourne.

Bluestone and bluestone mixtures such as bluestone and arsenic, bluestone and nicotine sulphate, are commonly used worm drenches. There is no particular worm drench which is likely to be effective against all worms.

[*Continued on page 355.*

WHEAT QUALITY and NEW VARIETIES

Wheat Advisory Committee Meeting

Some of the wheat experimental plots on the property of Mr. E. W. Dahlenburg, "Ellerslie," Salisbury, 1943.

A MEETING of the Victorian Wheat Advisory Committee, comprising representatives of millers, bakers, merchants, shippers, wheat growers and the Agricultural Department, was held on the 17th May last. The Committee was formed a few years ago, primarily to consider matters relating to the quality of Victorian wheat, and to recommend such new wheat varieties as could properly be released.

The main question discussed at this particular meeting concerned the present baking quality of flour from local wheat. Mr. Stockdale, of the Melbourne and Suburban Master Bakers' Association, reported a slight, but noticeable, decrease during the past two years in quality of flour supplied to city bakers. Mr. Jeffrey (Associated Bread Manufactories) reported general satisfaction by country bakers, except in the Mallee and the Wimmera, where baking quality was not quite so good as in prior seasons. Mr. Gatehouse (Victorian Millowners' Association) supported the claim that quality had deteriorated of late, and questioned whether there was not evidence of a general decline in quality, for which Magnet, and particularly Quadrat, might be responsible. Mr. Thompson, General Manager, Australian Wheat Board, supported the contention of a general decline in quality, but thought that seasonal and war-time conditions, including the fact that millers were not free to select wheat to suit their own requirements, were the predominating causes of any troubles experienced with local or export flour.

Mr. Jewell, Agricultural Research Chemist of the Department of Agriculture, outlined his Department's point of view, and claimed that there was no evidence of a general decline in quality, and that statements to that effect were unwarranted and damaging. In support of this, he presented the following statement to the Committee:—

A General Statement on the Quality of Victorian Wheat

The allegation has been made on a number of occasions of late that the quality of Victorian wheat is progressively declining, and that the decline in quality has been to a large extent due to unsuitable varieties being planted by growers. While it is freely admitted that Victorian wheat is not perfect and leaves room for considerable improvement in quality, exception is taken to the allegation of a general

deterioration in the quality of the wheat in this State. Briefly, the evidence refuting such an allegation is as follows:—

(*a*) The official f.a.q. sample has been critically examined for the past sixteen years. The collected data, chemical and physical, give no evidence of a progressive deterioration in recent years; there is, rather, some evidence of improvement of that quality of late, as judged by Pelshenke and farinograph figures. There is a seasonal fluctuation in protein, to be discussed later, but no progressive change.

(*b*) Representative samples of wheat from all country silos have been tested for the past three years, and a survey of the results shows no evidence of deterioration during that period.

(*c*) Numerous varieties from Departmental plots from various parts of the State have also been analysed and tested annually for years past, and again, there is no evidence of a general decline in quality.

(*d*) Since the inauguration of this Wheat Advisory Committee, the Departmental policy of breeding for quality as well as for yield has been vigorously pursued, and the general trend in quality has been upward, even if only due to the replacement of Free Gallipoli by wheats of superior quality.

(*e*) Although some mills, because of restricted supplies of wheat, have occasionally found difficulty in meeting the export standard for flour, no mill failed to do so during the past twelve months, and no export flour was rejected during that period.

(*f*) No complaints regarding flour quality were received by the Department from bakers during the past two years.

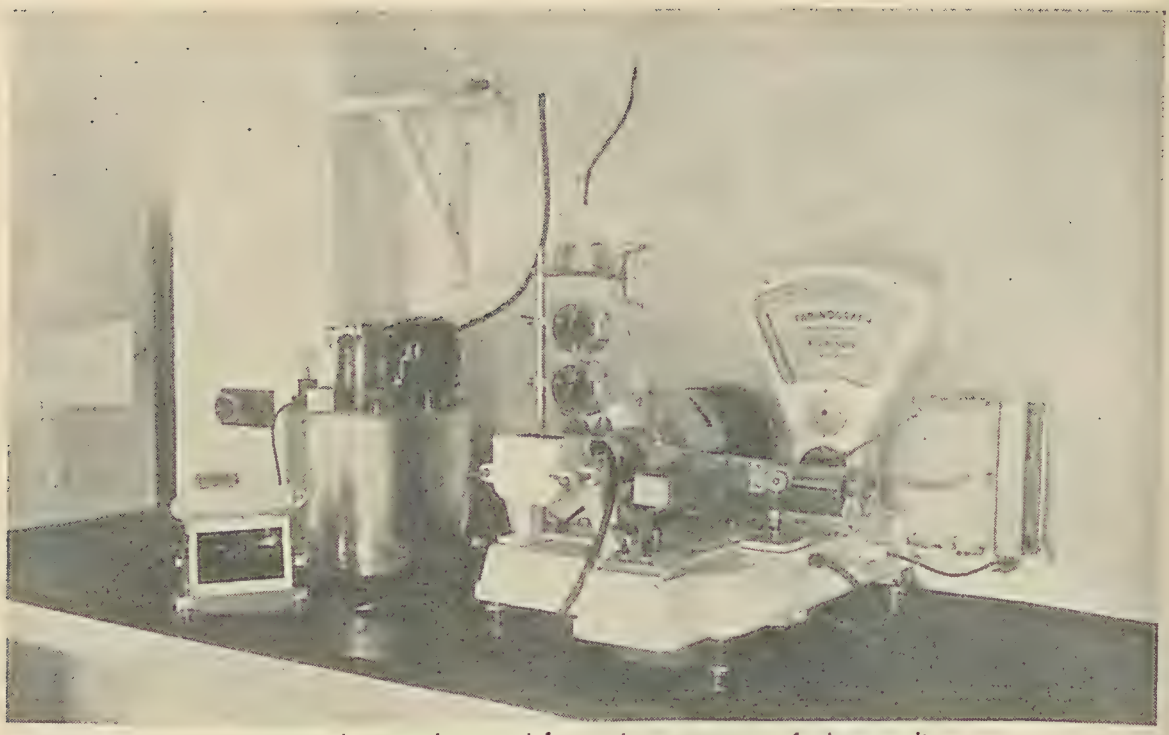
(*g*) As far as can be ascertained, the statement of a deterioration in quality has been based mainly, if not entirely, on a consideration of gluten content. While there has been no general trend towards low gluten, some few centres, particularly in a section of the Wimmera, produce wheat of low-protein content, and have done so in the past few years. These centres have been recognized for some time, and steps are being taken to determine how the gluten can be increased. It is, however, inaccurate to attribute these occurrences of low-gluten wheat to unsuitable varieties. Gluten content is almost completely independent of variety, but is governed by seasonal and soil conditions; where the latter are conducive to low gluten, the same low gluten would occur whether Quadrat or Pusa 4 were grown. For example, samples from different farmers in the one district this year showed the one variety Magnet with the lowest (18 per cent.) and highest (36 per cent.) gluten of all wheats tested from that district; Quadrat ranged from 20 to 34 per cent., and Dundee from 19 to 30 per cent.

It is felt, therefore, that allegations to the effect that there has been a decline in the quality of Victorian wheat are unwarranted and likely to do actual harm, and it is for this reason that the foregoing statement is issued. On the other hand, the need for a further improvement in the quality of Victorian wheat is admitted by all interested parties, not only to improve the baking quality of local flour, but also to increase its attractiveness, either as wheat or flour, on overseas markets. This need has been reflected in the Departmental wheat-breeding policy, and in the activities of this Advisory Committee.

The prospect for a decided improvement in the near future is brighter than for some considerable time, in that four new wheats of much better quality than Ghurka are recommended for release. Further, any wheat to be recommended in the future will be a decided improvement on Quadrat or Magnet. These two wheats were far advanced in the breeding programme before the quality aspect was given the consideration it gets to-day. While these two varieties, from point of view of quality, served their purpose when released, wheats of similar quality would not be advocated in the future. The four new varieties recommended to-day, showing a marked increase in quality on the varieties they will replace, and the spread of Pindar—a markedly better quality wheat than Ghurka—must ensure an appreciable improvement in the general quality of Victorian wheat in the next few years.

At the conclusion of the discussion, the following resolution was carried unanimously:—

> "That having heard statements regarding the quality of Victorian wheat and flour the Committee concludes that there is no evidence to suggest a general deterioration in the quality of Victorian wheat, although seasonal and war-time conditions have had a depressing effect on the quality of flour available for local or export markets."



The Farinograph—a machine used for testing one aspect of wheat quality.

Wheat Varieties

The chairman (Mr. J. Brake) had explained that because of war-time activities, departmental officers had been forced to restrict the amount of experimental work conducted on wheat, but that the basic essentials had been carried on. Mr. Miller, the Senior Inspector of Agriculture, then presented the following report, outlining certain varieties recommended for release, including quality assessments as supplied by Mr. Jewell.

Wheat Varieties Recommended for Release

At the last meeting of the Victorian Wheat Advisory Committee, held in March, 1942, the Committee endorsed the list of varieties recommended by the Department of Agriculture as set out in this statement, and no change has been made since that time.

The extent to which the recommendations have been followed is difficult to assess, and no statistics have been collected by the Government Statist since those issued for the 1940 season. It is thought, however, that there have been increased plantings of all the new varieties, principally of Regalia and Pindar in the Mallee, and of Magnet and Quadrat in the Wimmera and northern districts.

In 1942 very high yields were obtained in most districts and the new varieties were well received by farmers. Last season a drought was experienced over a major portion of the wheat belt, relieved only by the cool weather at ripening time which permitted full development of the grain, with the resulting high weight of the f.a.q. sample.

Limited attention has been given to cereal experimental work since 1941, there being practically no staff available for this work owing to enlistments and the greater need for attention to priority crops. However, the nucleus of the work has been maintained and results achieved with the more promising of the new varieties at a limited number of centres. Comments on their performance are submitted in this report, but it is emphasized that the recommendations made are tentative in view of the incomplete data available concerning them.

Arrangements have been made for the multiplication of seed of four new varieties in order that all or any of them may be distributed to farmers as soon as possible, provided that the 1944 evidence confirms the favorable impression already formed regarding them and that this Committee endorses their release.

The varieties are Pindar Selection W603V, Wannon x Ghurka L6031 B5-1, and Ghurka x White Fife L5266 T39-1-1 recommended for the Wimmera, and a new variety recommended for release in the Mallee, Ghurka x Ranee M6173 T14-2-1-1. All of these varieties produce flour of better quality than Ghurka, as is indicated later.

Pindar Selection W603V.—This new crossbred, bred at the State Research Farm, Werribee, is, as its name indicates, a selection from Pindar. It is a medium short-strawed mid-season variety, slightly earlier and taller than Ghurka, and with larger grain. It is resistant to flag smut, but no evidence is available yet regarding rust susceptibility.

The variety has been tested for three years only in replicated trials in the Wimmera and for shorter periods elsewhere, but as is shown in the table hereunder, its performance to date is very promising. At Longerenong College it has given higher yields than Quadrat in two seasons (in 1942 the plots were ruined by storm). At Salisbury it outyielded Quadrat in two seasons by 8·6 bushels and by 3·4 bushels per acre, but in the other year it yielded 2·7 bushels less than Quadrat. At Kaniva it has yielded more than Quadrat in both years, while at Charlton no appreciable difference has been shown between these two wheats. There have thus been nine acceptable comparisons made under Wimmera conditions during three years, the average result being Pindar Selection 42·9 bushels per acre and Quadrat 40·9 bushels per acre.

The results in the Wimmera, including also those of the two other varieties discussed below, are set out in the table hereunder.

Quality of Pindar Selection W603V.—Pindar, a Ghurka Selection, is a plump wheat of much higher baking quality than Ghurka. It has a Pelshenke figure of the order of 50 minutes (Ghurka 32 minutes), a very much better farinograph diagram, and improved baking qualities; it is classed as a slightly better wheat than Ranee. This Pindar Selection W603V shows an appreciable improvement in quality over Pindar.

Recommendation.—It is recommended that this selection be multiplied and released to farmers in the southern Wimmera in 1945, subject to the evidence of 1944 confirming that now available.

Wannon x Ghurka L6031 B5-1.—This crossbred, bred at Longerenong College, has been tested there for seven years, and for shorter periods elsewhere. Its best results have been given at Longerenong. It is a mid-season variety, medium tall, possessed of good agronomic features, except that it is more susceptible to flag smut than Ghurka.

At Longerenong over seven years it has yielded 39·8 bushels per acre as compared with 39·4 of Quadrat. At other Wimmera centres, however, it has on the average yielded considerably less than Quadrat, as has happened also in other parts of the State. It is evident, therefore, that more information is required before it can be said that this crossbred is particularly suitable for the southern Wimmera.

Quality of Wannon x Ghurka L6031 B5-1.—This new variety is of higher quality than Ghurka, its Pelshenke figure is about 15 minutes more, and its farinograph diagram is better, with slightly longer mixing time and greater stability. Its quality is classed as Ghurka plus.

WIMMERA.

	Longerenong.		Salisbury.		Kaniva.		Charlton.	
	4 Years.	2 Years.	4 Years.	3 Years.	3 Years.	2 Years.	3 Years.	2 Years.
Average Yields in Bushels per Acre.								
Ghurka	34·4	32·6	38·3	42·3	44·2	46·4	34·8	30·2
Quadrat	37·2	36·2	39·5	43·3	48·2	51·2	37·3	31·7
Magnet	36·6	37·8	40·6	44·8	49·7	54·1	33·7	28·8
Baldmin	34·5	30·4	36·6	39·7	..	..	35·6	29·6
Bencubbin	..	..	..	..	..	..	32·9	27·0
Pindar	35·4	34·6	38·6	43·4	..	50·6	34·2	30·2
Pindar Selection W603V	..	37·2	..	46·5	..	53·8	..	32·1
Wannon x Ghurka L6031 B5–1 ..	38·2	36·4	39·0	43·1	46·1	48·2	36·1	31·9
Ghurka x White Fife L5266 T39–1–1 ..	38·2	35·3	36·2	39·8	46·5	46·7	34·7	28·9

Recommendation.—While Pindar Selection promises to be a better variety in all respects than Wannon x Ghurka, the quality of the latter is such that seed should be multiplied for release if considered desirable in the light of future evidence.

Ghurka x White Fife L5266 T39-1-1.—This crossbred was bred at Longerenong College with the objective of combining the high flour quality of the Canadian variety White Fife with the prolificacy of the standard variety Ghurka. Its yielding ability is shown in the table on page 353, the results at Longerenong being particularly promising, as for four years it has given higher yields than both Quadrat and Ghurka. At all other centres, however, it has given lower yields than Quadrat, but the periods of test have been too short to assess the real comparative prolificacy of these two varieties.

It is a mid-season white-chaffed wheat, and there has been one report of shedding its grain under stormy conditions. Its resistance to flag smut is moderate.

Quality of Ghurka x White Fife L5266 T39-1-1. This crossbred has quality characteristics tending towards those of White Fife. Its average Pelshenke figure is about 70 minutes and has been over 100 minutes. It has the farinograph diagram of a medium strong wheat. It is the strongest of the four new varieties discussed in this report and should exert greatest benefit in a blend.

Recommendation.—Arrangements have been made to multiply the seed of this variety, and it is recommended that it be distributed to farmers with the appropriate advice on its yielding ability. The planting of this wheat would be encouraged if a premium were paid for it.

Ghurka x Ranee M6173 T14-2-1-1.—This crossbred, selected at the Mallee Research Station, Walpeup, has successfully combined the desirable characters of its parents and is an early maturing variety of medium height with good agronomic characters, easy to thrash but holding its grain well. It is fairly resistant to flag smut and less susceptible to rust than Ranee 4H.

In junior trials for many years and in replicated tests over the past four years at the Mallee Research Station, it has consistently given greater yields than the standard varieties and on the average has outyielded Quadrat by 1·3 bushels per acre.

At Woomelang, Ultima and Berriwillock it has given the highest average yields for two or three years, and there seems little doubt that these indications will be maintained in future tests.

It is not the type of wheat expected to suit average Wimmera conditions, but even there in some seasons it has given better results than Ghurka.

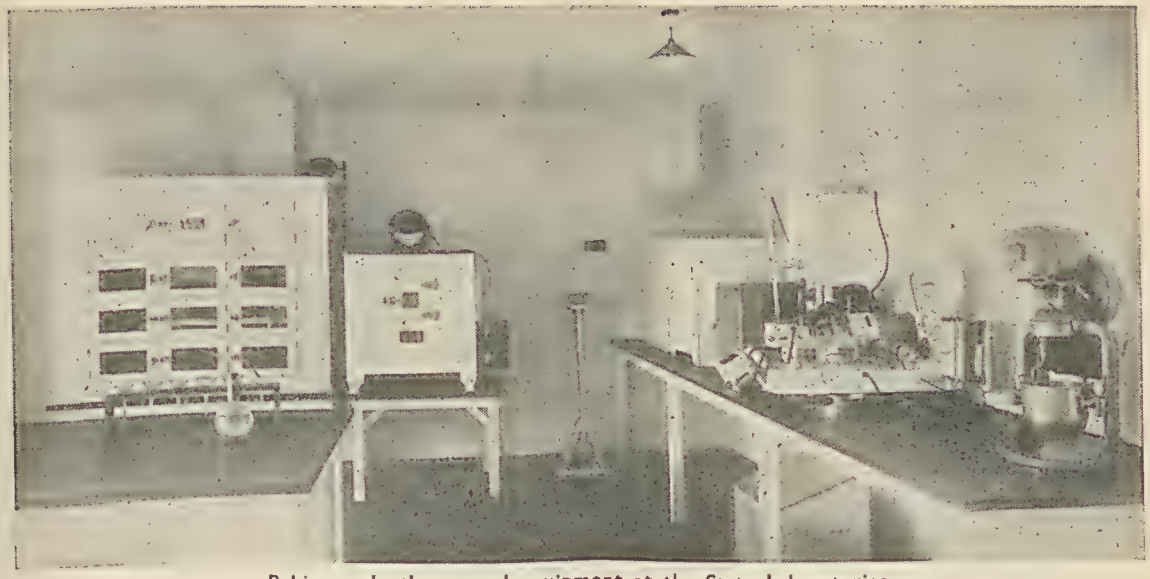
The results of the trials in the Mallee are given in the table hereunder.

Quality of Ghurka x Ranee M6173 T14-2-1-1.—This crossbred has the quality characteristics of its Ranee parent. It has, on the average, a better Pelshenke and farinograph than Ranee, and at least equivalent baking quality. It is classed as being about equivalent to Ranee in quality, but may have somewhat better effects in a blend.

Recommendation.—On present indications this cross bred, because of its flour quality, would be a more desirable variety to replace Ghurka than Quadrat. It is therefore recommended for distribution subject to the evidence of 1944 confirming present favorable impressions.

MALLEE.

	Walpeup.	Woomelang.	Ultima.	Berriwillock.
	4 Years.	2 Years.	3 Years.	2 Years.
	Average Yields in Bushels per Acre.			
Regalia	20·3	31·4	11·5	21·4
Ranee 4H	20·0	31·4	10·8	21·8
Ghurka	19·2	34·4	9·6	21·2
Bencubbin	20·8	32·0	11·2	..
Pindar	20·2	23·9	9·3	20·9
Baldmin	19·6	30·9	9·8	..
Quadrat	21·1	26·0	9·6	23·6
Ghurka x Ranee M6173 T14-2-1-1 ..	22·4	32·2	11·6	23·7



Baking and other cereal equipment at the State Laboratories.

General Recommendations

No other change is recommended in the list of varieties approved in 1942, although at the next meeting it will be necessary to discuss the full list in detail. It is proposed to request the Government Statist to take a census of the wheat varieties sown in 1944.

The Committee unanimously agreed to accept the report, with the exception of the last paragraph (General Recommendations), and to approve of the release of these new wheats, subject to the conditions outlined in the report.

With relation to the last paragraph "General Recommendations," Mr. Gatehouse questioned the advisability of continuing to recommend such wheats as Quadrat and Magnet, claiming that these two varieties, particularly the former, were inferior to Ghurka and were likely to reduce the general quality of Victorian wheat. A general discussion on this point took place, when it was decided to postpone the question of general recommendations, including Quadrat, until a further meeting to be held next October.

General

Three other matters were discussed. A resolution was passed forming a sub-committee to present a case to the Minister of Agriculture for increased facilities and staff for cereal investigations. A minute was unanimously approved expressing appreciation of the services rendered to the wheat industry in general, and the wheat grower in particular, by Mr. Dahlenburg (Victorian Wheat and Wool Growers Association, Wimmera Section). Mr. Dahlenburg for many years has actively cooperated in experimental plot work on his property at Salisbury. It was hoped that steps could be taken to ensure that Mr. Dahlenburg would not have to discontinue this important work. A further appreciative minute was recorded to Mr. G. S. Gordon, Cerealist of the Department of Agriculture. Mr. Gordon has just reached the retiring age, but was continuing in office for the present. This officer has been responsible for the breeding of many of the wheats now widely grown, and his work has had a great influence on the wheat industry in Victoria.

DRUGS ON THE FARM—*continued from page 349.*

An article on the treatment of worms and the correct worm drenches to use appears in this issue.

Phenothiazine.—Commonly sold in the form of Phenzeen Phenovis, Phenovine, phenothiazine, is highly efficient against such worms as the small hair worm of sheep. Due to its relatively high cost, phenothiazine is normally used for the "tail" of a flock, that is, those which have not responded to treatment with other worm drenches.

Other more complex drugs, such as stilboestrol, sulphanilamide, nux vomica, &c., are not included here, as these should be used only on the advice and prescription of a qualified veterinary surgeon.

How to Ripen Green Tomatoes in Winter

By BASIL P. KRONE,
Instructor in Tomato Culture

Many market gardeners in the farming areas adjacent to Melbourne grow late crops of tomatoes. The seedlings are planted out about Christmas week and sometimes later, in order that harvesting can be commenced about the third or fourth week in April for the high prices prevailing at that time ; but during the months of May and June, with the onset of wintry weather, tomatoes cease to ripen and hundreds of cases of otherwise good tomatoes are left in the field to rot.

It is believed that larger quantities of local tomatoes would favorably compete for the high prices ruling late in the season if they could be saved from the wet and frosty weather and satisfactorily ripened. Southern tomato growers will be glad to learn that this can be done at small cost, and portion of the loss of late tomatoes overcome if the suggestions contained in this article are followed.

IN the past season it was essential that certain tomato crops grown for seed, but planted rather late, should be ripened, as the seed in green fruit is not germinable. In the course of carrying out preliminary trials on such ripening, and later, during the actual ripening of appreciable quantities of fruit, information was obtained which, though far from complete, seems sufficiently important to be described for the benefit of growers who may desire, in future years, to ripen late tomatoes.

The main essentials for satisfactory ripening are temperature, light, and controlled ventilation. All of these factors are important in determining good colour.

Temperature controls the rate of ripening, but in ripening rooms with insufficient ventilation, the temperature must not exceed 65 degrees F., otherwise condensation of moisture occurs and the fruit develops a dull, pale-red colour, to say nothing of serious fungal rots, which increase under such humid conditions. Temperatures lower than 60 degrees F. retard the ripening process and, if the fruit does colour at all, it becomes a dull, pale red hue.

Sufficient but controlled *ventilation* permits the ripening to be hastened at increased temperatures, up to 75 degrees F. if necessary, without condensation occurring. This ventilation and the heating devices should be controlled in the perfect ripening room to keep the room as near to the desired temperature as possible, and prevent the appearance of drops of moisture on the fruit.

Light.—It does not seem to have been realized in Victoria, until these trials were made, that light assists in the development of colour. It has been found that if light can be admitted to the ripening room, even green tomatoes will develop a good, red colour. In the absence of a glass roof and windows for the admission of sunlight, electric light may be used, and gives fairly good results.

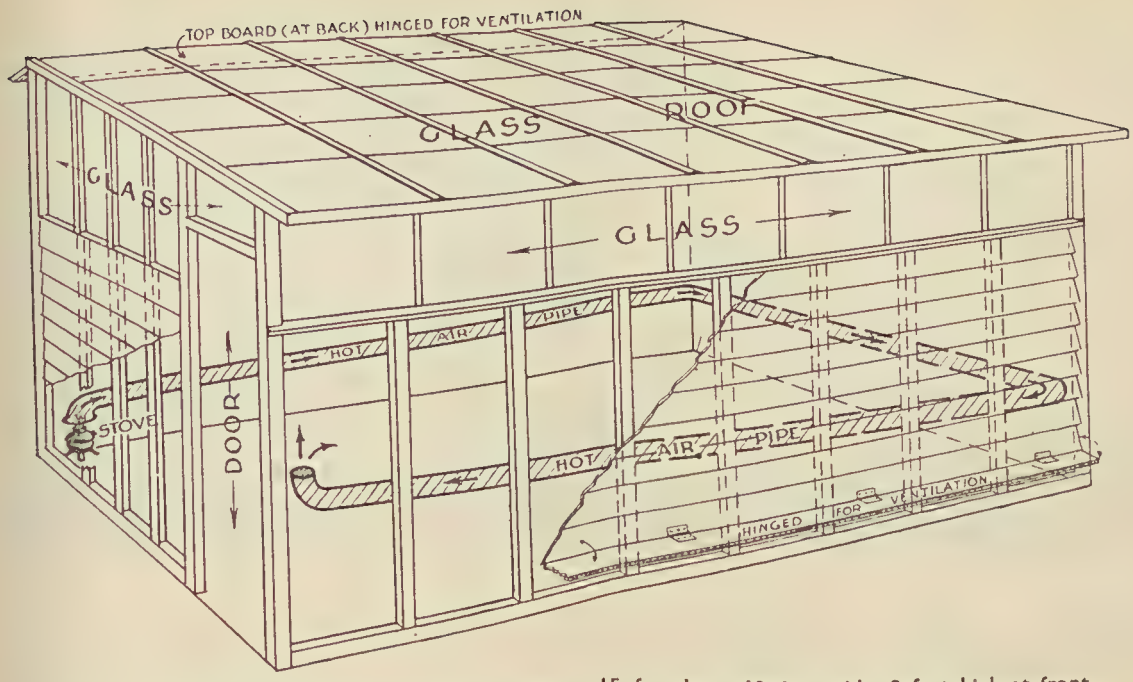
According to the condition of the fruit and temperature and lighting conditions, tomatoes require from five days to a fortnight to ripen to a stage suitable for marketing. If longer periods are required, it will be found that most varieties, although remaining edible, have a tendency to soften. This condition can be guarded against to a certain extent by slightly increasing the temperature and, if necessary, the ventilation.

In some of the tests made, it was shown that where seed from green tomatoes failed to germinate, a 90 per cent. germination was obtained from seed from similar fruit slowly ripened by the method described hereunder:—

First it is necessary to erect a ripening room. The structure and heating devices suggested herein are obviously not suited to a precise control of temperature and humidity such as would be possible in a fully-insulated and specially designed room with automatic heat control; but, in practice this year, the relatively simple structure and devices mentioned have given quite satisfactory results and should be of interest to the grower whose work does not justify a more expensive installation.

The Ripening Room

The suggested room is of the skillion type with a glass roof sloping towards the north. The front and side walls could consist of cement sheets, or other suitable material up



Plan for a suggested ripening room for tomatoes, 15 feet long, 10 feet wide, 8 feet high at front, 9 ft, 6 in. at rear. These measurements could be altered to suit individual requirements. The glass roof should be covered on frosty nights, if the heater is not in use, to prevent frost-injury to the top layers of fruit.

to a height of, say, 4 feet, with glass 2 feet above. Glass is not required in the back wall. A 6-in. flooring board, however, should be let in at the top of the back wall and fastened by hinges at the top of the board, and a similar board near the bottom on the opposite side, to control the ventilation.

Artificial heating can be efficiently provided, very cheaply, by obtaining a few 6-ft. lengths of 4-in. flue piping (similar to ordinary "down" piping used by plumbers) to extend around three sides of the room, four 4-in. 90 degree bends, and a small kerosene stove, such as the "Blue Flame" type; the cost of the stove, which is about the size of an ordinary "primus" would not be very great.

One of these stoves will ripen up to 500 cases of green tomatoes at a time, at the surprisingly low cost of approximately ¾d. per hour, but if a grower had smaller quantities of fruit, say, up to 100 cases, an ordinary brooder lamp should do.

The installation can be of a temporary nature, so that it may be removed and stacked away when the ripening season has ended.

To install the heating device, place the pipes around three sides of the room, about 3 inches from the wall; connect the pipes at the corners with the "bends" (do not use "elbows," hot air flows around curves much better than it does around right angles); then place the lamp or stove at one end and fit a "bend" on the end of the pipe and invert it over the flame; another bend should be placed on the exit end of the piping and turned either up or sideways in order to control the flow of hot air. The hot air should be discharged inside the room, not wasted outside. It will be observed that a large percentage of the heat is produced by radiation from the pipe in addition to the hot air; also the hot air will be more evenly distributed if the "bend" is used on the end of the pipe as previously suggested. It gives better control than a "damper." Brackets fixed to the wall would serve to support the pipes, which should be just slightly off the horizontal, say, a rise of 2½ to 3 inches in 6 feet, because hot air naturally rises and this will cause it to flow more easily. The installation should be kept as near to the floor as possible. It may be, that in cold weather, in less tightly constructed rooms, temperatures may fall below the

[*Continued on page* 364.

POULTRY FEEDING TESTS 1943-44

By W. O. PEDERICK, Assistant Poultry Expert, and A. G. CLARK, Poultry Foreman

EXTENDING over a period of twelve months from 1st April, 1943, to 31st March, 1944, poultry feeding tests were conducted at the State Research Farm, Werribee, to compare the respective values of rations containing no bran and pollard with the standard bran and pollard ration. For the purpose 300 Australorps and 200 White Leghorn pullets hatched in August and September, 1942, were used and divided into pens each containing 50 birds. The birds were intensively housed in a laying shed 110 feet long by 20 feet deep, divided into ten pens each 11 feet by 20 feet, providing a little over 4 square feet of floor space per bird.

The following rations were fed :—

Pens Nos. 1 (Australorps) and 10 (White Leghorn)—No mash. Mixed whole grain always available in hopper. Meatmeal always available in hopper.

Pens Nos. 2 (Australorps) and 9 (White Leghorn)—Dry mash consisting of crushed mixed grains with 10 per cent. meatmeal added. Mixed whole grains always available in hopper.

Pens Nos. 3 (Australorps) and 8 (White Leghorn)—Dry mash consisting of crushed mixed grains with 10 per cent. meatmeal added. Mixed whole grains fed in litter.

Pens Nos. 4 (Australorps) and 7 (White Leghorn) Dry Mash consisting of bran and pollard with 10 per cent. meatmeal added. Mixed whole grains fed in litter.

Pen 5 (Australorps)—Mixed whole grain in litter twice a day at the rate of 13 lb. per day. Meatmeal always available in hopper.

Pen 6 (Australorps)—Mixed whole grain in litter twice a day at the rate of 10 lb. per day. Meatmeal always available in hopper.

All the grain mixtures, both whole and crushed, consisted of four parts wheat, one part oats, one part barley, one part maize (by weight). The bran and pollard mash consisted of 30 lb. bran, 60 lb. pollard, and 10 lb. meatmeal. Green feed was fed to each pen daily and shell grit was always available.

As in previous tests, the cost of food was arrived at by taking the average wholesale prices published in the daily press during the year. Delivery charges were not added. The crushed grain was valued at three pence per bushel more than whole grain. The eggs laid were valued at the gross wholesale hen-egg price without deducting any marketing or grading charges. These charges would probably average approximately four pence

TABLE 1.

Pens.	System of Feeding.	Food per Bird.	Percentage of Mealmeal of Total Food.	Food per Dozen Eggs.	Average Production per Bird.	Average Return per Bird.
		lb.	%	lb.	Eggs.	£ s. d.
1, 5*, 6, 10	Whole grain with meatmeal always available	91·3	14·0	5·9	185·4	1 1 6
2, 3, 8, 9	Crushed grain with 10 per cent. meatmeal and whole grain	91·8	5·1	6·5	169·6	0 18 10
4 and 7 ..	Bran and pollard with 10 per cent. meatmeal and whole grain	94·0	4·9	6·3	180·4	1 1 1

* In Pen 5, 13 lb. of grain was fed each day, which with meatmeal makes an average of 107.9 lb. of food per bird per year. It was noted that at certain times of the year the birds would not eat 13 lb. of grain per day, and it was wasted in the litter. Ten pounds of grain per day for 50 birds (the amount given in Pen 6) appears to be the approximate amount required, as this was the amount consumed in Pen 1 where the grain was always available.

per dozen, which, with an average production on 180 eggs, would amount to 5s. per bird per year.

For the purpose of comparing results the various feeding systems have been grouped in Table 1.

Conclusion

These tests are actually a repetition of the previous tests, the results of which were published in the *Journal of Agriculture* for August, 1943. The results of both years' tests are consistent, and have shown that highly satisfactory results can be obtained by feeding whole grain and no mash, provided that the necessary amount of meatmeal is consumed to balance the ration. In the pens where crushed and whole grains were fed with a limited amount of meatmeal, the results were not so satisfactory.

Bran and pollard contain more protein than crushed or whole grain, therefore the limited amount of meatmeal gave better returns with bran and pollard than with crushed grain. Also where the higher percentage of meatmeal was consumed, it required less food to produce each dozen eggs. This indicates that it is uneconomical to feed a ration that does not contain the right percentage of meatmeal. That percentage, of course, should vary according to the kind of food used—crushed or whole grain apparently requiring more than bran and pollard.

In view of the shortage of bran and pollard and the difficulties of transport, the simple method of feeding a variety of whole grains plus free choice meatmeal can be recommended. In these tests the grain consisted of wheat, oats, maize, and barley, but in view of the difficulty at the present time in obtaining grains other than wheat, a test is in progress using wheat and meatmeal only, the results of which will be published next year.

Whole grain has not to be crushed or treated in any way, and in this respect it is much cheaper than other foods, and another advantage is that it cannot be adulterated without detection.

Breeding pens at the State Research Farm, Werribee.

Since the report of last year's test was published, quite a number of poultry keepers, especially those who are keeping poultry on general farms, have changed to this simple method of feeding, and have found it gives satisfactory returns with the minimum of labour.

Table 2 shows the total food consumed, cost of food, eggs laid, and their value and return over food cost.

TABLE 2.—TEST NO. 24.—WERRIBEE FEED TESTS, 1ST APRIL, 1943, TO 31ST MARCH, 1944 (12 MONTHS).

Pen No.	Fifty Birds per Pen.	System of Feeding.	Bran.	Pollard.	Crushed Wheat.	Crushed Oats.	Crushed Maize.	Crushed Barley.	Meat-meal.	Wheat.	Oats.	Maize.	Barley.	Total Food Consumed.	Cost of Food.	Eggs Laid.	Value of Eggs.	Return over Food Cost.
			lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	£ s. d.		£ s. d.	£ s. d.
1	Australorps ..	Mixed grain in hopper; meat-meal in hopper	..	..	..	..	..	..	630	2,114	528	528	528	4,328	16 9 2	9,114	70 10 4	54 1 2
		Average	..	..	..	..	..	..	..	..	..	..	..	**86·6**	**0 6 7**	**182·3**	**1 8 2**	**1 1 7**
2	Australorps ..	Dry mash—crushed grain; mixed grain in hopper	..	..	1,055	263	263	263	205	1,431	357	357	357	4,551	17 1 11	8,697	66 8 3	49 6 4
		Average	..	..	..	..	..	..	..	..	..	..	..	**91·0**	**0 6 10**	**173·9**	**1 6 7**	**0 19 9**
3	Australorps ..	Dry mash—crushed grain; mixed grain in litter	..	..	1,300	325	325	325	253	1,243	311	311	311	4,704	17 16 3	8,972	68 13 11	50 17 8
		Average	..	..	..	..	..	..	..	..	..	..	..	**94·1**	**0 7 1**	**179·4**	**1 7 6**	**1 0 5**
4	Australorps ..	Dry mash—bran and pollard; mixed grain in litter	688	1,378	..	..	..	..	230	1,358	230	230	230	4,674	15 18 2	9,037	69 9 6	53 11 4
		Average	..	..	..	..	..	..	..	..	..	..	..	**93·5**	**0 6 4**	**181·9**	**1 7 9**	**1 1 5**
5	Australorps ..	Mixed grain in litter (13 lb. per day); meatmeal in hopper	..	..	..	..	..	..	639	2,718	680	680	680	5,397	20 6 6	9,797	74 11 11	54 5 5
		Average	..	..	..	..	..	..	..	..	..	..	..	**107·9**	**0 8 2**	**195·9**	**1 9 10**	**1 1 8**
6	Australorps ..	Mixed grain in litter (10 lb. per day); meatmeal in hopper	..	..	..	..	..	..	660	2,091	523	523	523	4,320	16 9 7	9,445	72 4 4	55 14 9
		Average	..	..	..	..	..	..	..	..	..	..	..	**86·4**	**0 6 7**	**188·9**	**1 8 11**	**1 2 4**
7	White Leghorns	Dry mash—bran and pollard; mixed grain in litter	703	1,406	..	..	..	..	234	1,358	340	340	340	4,721	16 1 2	8,940	68 1 8	52 0 6
		Average	..	..	..	..	..	..	..	..	..	..	..	**94·4**	**0 6 5**	**178·8**	**1 7 3**	**1 0 10**
8	White Leghorns	Dry mash—crushed grain; mixed grain in litter	..	..	1,315	328	328	328	255	1,243	311	311	311	4,730	17 18 3	8,294	63 6 3	45 8 0
		Average	..	..	..	..	..	..	..	..	..	..	..	**94·6**	**0 7 2**	**165·9**	**1 5 4**	**0 18 2**
9	White Leghorns	Dry mash—crushed grain; mixed grain in hopper	..	..	1,186	296	296	296	230	1,187	297	297	297	4,382	16 11 6	7,954	59 13 2	43 1 8
		Average	..	..	..	..	..	..	..	..	..	..	..	**87·6**	**0 6 8**	**159·1**	**1 3 10**	**0 17 2**
10	White Leghorns	Mixed grain in hopper; meat-meal in hopper	..	..	..	..	..	..	636	2,048	511	511	511	4,217	16 0 11	8,793	67 0 3	50 19 4
		Average	..	..	..	..	..	..	..	..	..	..	..	**84·3**	**0 6 5**	**175·9**	**1 6 10**	**1 0 5**
		Total (500 birds) ..	..	..	..	..	..	..	..	..	..	..	..	46,024	170 13 5	89,103	679 19 7	509 6 2
		Average	..	..	..	..	..	..	..	..	..	..	..	**92·0**	**0 6 10**	**178·2**	**1 7 2**	**1 0 4**

Notes.—Average gross price of eggs, 1s. 10d. per doz.; food cost per dozen eggs, 5¼ pence; food consumed per egg laid, 8·2 oz.; food consumed per bird per day, 4 oz. Cost of food per bird per week, 1·6 pence.

Live Stock Notes

Compiled by
A. C. T. HEWITT, M.Agr.Sc.,
Live Stock Science Officer

Sheep

A DECLINE in the production of mutton and lamb during 1944-45 seems inevitable. During the year just ended slaughterings have been necessary to reduce the total number of sheep that could be carried on account of the loss of pasturage in the Western and North Central Districts, due to bush fires and to the drought in the Mallee, Northern, and parts of the Wimmera Districts.

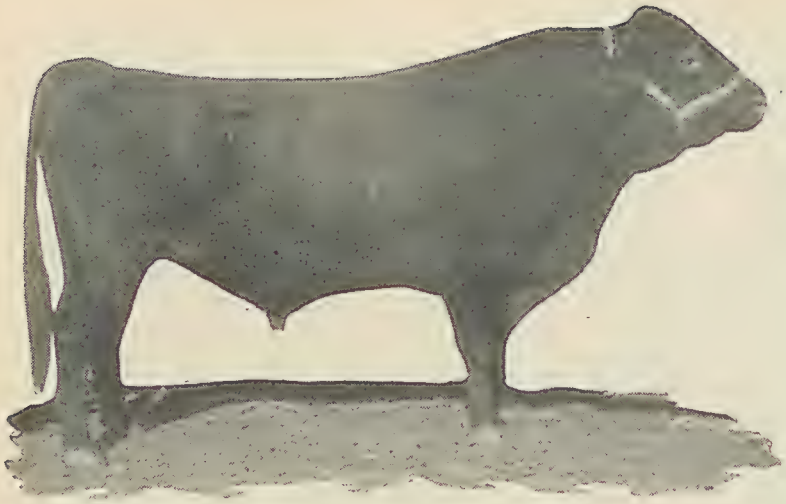
In the north and north-west of the State lambings are both very light and late. It is anticipated that many of these lambs will not be marketed until November, when lambs from the Western and North-Eastern Districts normally reach the markets. Thus a bottle neck at slaughtering yards such as occurred last year may recur. Fat sheep are making very high prices at the present time, therefore it would be wise for farmers to sell all fat sheep early and to market as few fat sheep as possible during the lamb slaughtering season, if there are signs of congestion at the works.

During 1942-43, 4,240,648 sheep and 4,850,648 lambs were slaughtered to produce 160,000 tons of mutton and lamb. During the year just ended, the approximate slaughterings of sheep will be 4,750,000, and of lambs 4,250,000, to produce approximately the same tonnage of mutton and lamb, but during the coming year a drop of 10 to 20 per cent. in mutton and lamb production is forecast unless markets remain firm at sellers' prices. If such occurs, sheep numbers will be considerably reduced.

With respect to sheep numbers in Victoria, the Victorian Government Statist (Mr. O. Gawler) has released the following information:—

Class of Sheep.	Sheep and Lamb Numbers at 31st March—	
	1943.	1944.
Rams..	254,722	245,791
Breeding Ewes ..	9,852,352	8,975,270
Dry Ewes	1,268,464	1,537,638
Wethers	4,403,994	4,265,800
Lambs under 1 year old	3,834,508	4,195,958
Total ..	19,614,040	19,220,457

These figures show that there are 877,082 less breeding ewes than last year and, as a result, it is to be expected that fewer lambs will be dropped. The increase in the number of lambs under one year old is due partly to the failure of the Northern and Mallee lambs to finish, and partly to the inability to have



"Woodburn Peter Pan," at 12 years of age.
[Leader Photo.

lambs delivered for slaughter on account of congestion at the works in November and December. Many of these latter lambs then lost their bloom and had to be held.

Dairy Cattle

Famous Red Poll Sire.

The influence of the Red Poll bull "Woodburn Peter Pan" in increasing milk and butter-fat production is well demonstrated by the performances of his daughters in the Department's stud at the State Research Farm, Werribee. This bull has 60 tested daughters, which is a record for any Red Poll bull in Australia, and may possibly be a record for any dairy sire. The average production of these daughters (correct to a mature equivalent basis) and the average production of daughters of the other sires extensively used in the "Victoria" stud are as set out in the table on the next page.

The splendid performances of these bulls and the fact that many of their descendants have been distributed amongst breeders and dairy farmers is a demonstration of the practical way in which the Department of Agriculture is assisting the dairy and beef industries in Victoria and Australia.

A younger herd sire is "Burnwood Masterpiece," and to date this bull has 20 tested daughters, which have averaged 332 lb. of butter-fat in 273 days on their first lactations. This is an excellent performance and evidence that "Burnwood Masterpiece" is already an outstanding sire.

A more recent acquisition to the stud is the young bull "Naranghi Master," at present being used with the heifers.

"Woodburn Peter Pan," "Burnwood Masterpiece," and "Naranghi Master" are bred from four of the best dual purpose cows ever imported into Australia, namely, "Marsden Mindful," "Marsden Mimulus," "Marsden Maryland," and "Marsden Marvel." "Woodburn Peter Pan," imported *in utero*, was by "Peadowns Pierrot," whereas both "Burnwwood Masterpiece" and "Naranghi Master" are grandsons of this bull, their respective dams, "Woodburn Mimulus" and "Woodburn Marvel" both being imported *in utero*. The diagram on the following page shows how these herd sires are related.

Under test, the cows mentioned in the above diagram have produced the following quantities of butter-fat:—

"Marsden Mindful" 723 lb.
"Marsden Mimulus" 463 lb.
"Woodburn Marvel" 400 lb.
"Marsden Maryland" 490 lb. (4 yr.)
"Marsden Marvel" 385 lb. (2 yr.)
"Woodburn Mimulus" Untested.

"Burnwood Masterpiece," at 7½ years of age.
[Leader Photo.

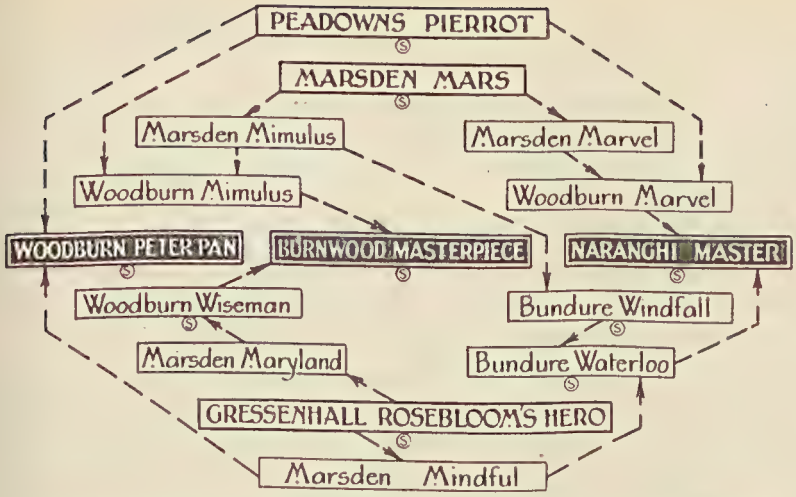


Diagram showing the relationship of "Woodburn Peter Pan," "Burnwood Masterpiece," and "Naranghi Master," to each other.

"S in circle" indicates sire; the arrows point from parent to progeny.

Daughters by—	Number of Tested Daughters.	Average Mature Equivalent Production of Daughters—		
		Milk.	Test.	Butter-fat.
		lb.	%	lb.
"Nicotine" (1910–21)	41	8,850	4·26	376
"Belligerent" (1914–27) ..	45	8,700	4·41	382
"Vice Regal" (1918–30) ..	56	8,290	4·47	370
"Woodburn Peter Pan" (1932–)	60	9,280	4·56	417

An Inspiration to Pig Raisers

An outstanding performance of pig production was seen recently on the property of Mr. R. M. Jack, Rutherglen, where mixed farming is practised and a herd of nine breeding sows and one boar is kept. In their last litters these nine sows reared 99 pigs. Six of the litters were weaned, and the other three were over six weeks old at the time of inspection in July, 1944. Among the three litters not weaned was one of fourteen suckers 52 days old, this being the largest of the nine litters.

The litter of fourteen was weighed, and its total weight calculated to 8 weeks old was 528 lb., which is double the weight of most litters at that age.

Such performances excite interest in the methods adopted for their achievement.

The stock on this farm are of the large white breed, the breeding sows being fairly large in type, and all showing good udder development indicative of high milking capacity. The boar is very large, being strong in bone and long in the middle.

So that selection and culling of breeding sows can be based on performances, Mr. Jack keeps records of services, farrowings, weanings, and marketings. Baconers are sold when about 180 lb. dressed weight.

The accommodation for the pigs is miscellaneous, and includes intensive pens, yards, and paddocks. None of it is elaborate.

The pigs' diet consists of separated milk, crushed wheat, and pastures or green feed from the garden. There is nothing unusual in the ingredients used in pig production on this farm, but the excellent results show that they are used with skill and care above the ordinary.

[L. A. Downey, H.D.A., Pig Expert.]

The Australorp Fowl

The Australorp, as the name implies, was produced in Australia from Black Orpingtons originally imported from England, and known in this country as the Utility Black Orpington. It is more like the type of the Black Orpington that existed many years ago, but it is smaller and much closer in feather with less fluff than the present exhibition type of Black Orpington.

The Black Orpington was first recognized as a breed in 1886. It was evolved in England from crosses of Black Minorcas, clean-legged Black Langshans, and black coloured fowls with Plymouth Rock blood, by the late Mr. William Cook, Orpington, Kent, England, from which town the name of the breed originated. It has been stated that all Black Orpingtons produced were not the result of these crosses, as breeders other than Mr. Cook tried various crosses of which there are no records. Quite early there was an infusion of Black Cochin blood, as indicated by the shape and by the recurrence of hock and leg

feathers. It may now be assumed that the four breeds named above were chiefly used in founding the Black Orpington.

Black Orpingtons were imported from England to Australia on various occasions, and breeders here succeeded in producing a type of great utility, and some high egg production records have been obtained. In the Burnley Egg-laying Competitions, inaugurated in 1911, and conducted by this Department, the highest twelve months' record for a single bird of any breed since the commencement was made by an Australorp entered by Mr. F. W. Becker, Cheltenham, in the 1940-41 competition. This bird laid a total of 340 first-grade eggs in the 52 weeks. In addition, it laid 6 underweight eggs during the same period.

The utility type of Black Orpington, as produced in Australia, was then imported into England and other countries, where later it was recognized as a distinct breed, being named the Australorp. Finally this name was adopted in Australia. In the Burnley Egg-laying Competition, 1930-31, the name Australorp was used for the first time, instead of Black Orpington, which was used previously in the competition for Utility Black Orpingtons.

At the present time separate "standards" are in existence for this breed in the various States of Australia, and also in other countries.

Although the White Leghorn is the most popular egg-laying class of fowl, it belongs to a group known as "light breeds," and is not included in the table class of poultry. On the other hand the Australorp has not only been developed for high egg production in this country, but it belongs to the group of "heavy breeds" which are also good table birds.

Australorp has done well when housed on the intensive system, but it is particularly adapted to free range. Apart from this minor difference, the same general system of management can be carried out with this breed as with other types of fowls kept for egg production. On account of its excellent egg-laying qualities, quiet disposition, and the simple colour of its plumage, free from complicated feather markings which can only be reproduced with any degree of satisfaction by specialist fanciers, the Australorp has proved to be the most popular heavy breed in Australia.

[H. F. Clinton, Poultry Expert.]

Bee-keeping

During the present month advantage should be taken of fine weather to open and examine the interior of all hives, and to note the condition of each.

As breeding will have commenced, the feeding of young larvae will create a greater demand on the stores within the hive. This should be considered when estimating the probable requirements of the colony, pending a flow of nectar. In cases of shortage, or even probable shortage, sugar syrup should be fed. In estimating the probable requirements of the colony, the bee-keeper should be guided by his knowledge of the flora available to the bees in the particular area in which the apiary is situated. In some districts bees may require assistance until the end of September, when Cape weed bloom should provide sufficient nectar and pollen for all requirements.

The adverse conditions prevailing during last summer and autumn will be reflected in a large percentage of colonies emerging from winter below normal strength. Skilful management and attention will be necessary to prevent further losses. Weak colonies placed together in a sheltered site, preferably within reach of natural food, will rally much quicker than if left to compete with colonies much greater in strength. In selecting a site, an eastern slope, sheltered from cold winds, should be the aim.

During November weak colonies may be assisted by inserting a frame of emerging brood transferred from a stronger colony. This is a practice often abused by transferring brood during cold weather, and before there are sufficient bees in the hive to cover it.

[J. W. Thomlinson, Apiary Inspector.]

HOW TO RIPEN GREEN TOMATOES IN WINTER—*continued from page 357.*

optimum at night, but on observations to date the only effect of this would be to slightly delay ripening.

A room 12 feet long, 10 feet wide, and 8 feet high will accommodate 300 cases, and is a very useful size for the average grower.

The tomatoes should be loosely held in "flat" bushel cases, which should be stacked as openly as the quantity to be ripened in the room with permit, to allow free entrance of warmth and light to all fruit. "Staggered" stacking is an excellent idea.

Warning

In most ripening rooms, oxygen in the atmosphere tends to become exhausted and people should not remain inside the room for any length of time with the door closed.

Investigations of the Flour Beetles of the Genus Tribolium

II. Effect of Different Mill Fractions on the Larval Development and Survival of *T. castaneum* (Hbst.) and *T. confusum* (Duv.).

By L. W. Miller, B.Agr.Sc., Assistant Entomologist, Biological Branch.

IN an earlier paper (Miller, 1944), it was recorded that, whereas, in Victoria, the rust-red flour beetle, *T. castaneum* (Hbst.), was the dominant species of the genus *Tribolium* present in wheat, the confused flour beetle, *T. confusum* (Duv.), was the most prevalent species within flour mills.

One of the factors thought to have a bearing upon the position was the food available to the insects within flour mills. Consequently, a study was commenced in 1942 of the response of the two species of *Tribolium* to a range of milled products.

The results herein recorded deal with the effect of different diets upon the larval development and survival of *T. castaneum* and *T. confusum*.

Materials and Methods

The food materials used in these experiments consisted of six mill stocks which were obtained from different machines in a flour mill during the gristing of a uniform grade of wheat.

The details of these products, together with their chemical compositions, are shown in Table 1.

All stocks were heat treated, (70° C. for 10 minutes) prior to use, to kill any insects that might have been present.

Owing to the hygroscopic properties of flour and wheat products (Bailey, 1920), each stock was placed in shallow trays and stood in an incubator for at least seven days prior to being used, so that the moisture content came into equilibrium with the environment. As can be seen from Table 2, the equilibrium moisture contents of the stocks were not identical, consequently in all tests, equal quantities, on a dry weight basis, were used.

TABLE 2.—EQUILIBRIUM MOISTURE CONTENTS OF SIX MILL STOCKS WHEN CONDITIONED AT 30° C, AND 75 PER CENT. R.H.

Stock No.	Equilibrium Moisture Content.
	Per Cent.
1	11.35
2	11.70
3	11.50
4	11.35
5	11.20
6	11.25

TABLE 1.—ANALYSES OF PRODUCTS USED IN NUTRITIONAL STUDIES ON *T. castaneum* AND *T. confusum*.

Stock No.	Description.	Percentage.							Vit. B_1 Gamma/gm.
		Moisture.	Protein N x 5.7.	Maltose.	Sucrose.	Total Ash.	CaO.	P_2O_5.	
1	First break stock ..	15·0	10·60	0·82	2·64	1·316	0·088	0·62	4·3
2	3rd and 4th break flours	14·6	12·31	1·18	1·74	0·464	0·092	0·24	1·5
3	A, B, C, and D reduction flours	13·7	9·26	1·72	1·65	0·344	0·072	0·19	0·7
4	All other reduction flours	13·3	11·09	1·77	1·92	0·420	0·074	0.23	1·6
5	Tails of B_2 scalper ..	12·3	15·76	3·73	6·94	2·870	0·102	1.22	26·3
6	Tails of M centrifugal ..	11·4	14·42	3·49	4·35	1·120	0·064	0.52	10·9

The tests were conducted in a cabinet maintained at a temperature of 30 ± 0·1° C. and a relative humidity of approximately 75 per cent., achieved by passing a continuous stream of air over trays containing saturated solutions of sodium chloride.

Light was completely excluded from the cabinet, it having been shown by Chapman (1931) that these insects could be bred continuously in the absence of light without suffering any ill effects. The exclusion of light from the cabinet was simpler to achieve than it would be to obtain uniform illumination.

The insects used in the experiments were the progeny from stock cultures of flour beetles, that had been bred up, at 30° C. and 75 per cent. R.H., from small numbers of beetles collected locally in 1941. The stock cultures were maintained on a diet of dried powdered yeast and white flour in the proportions found by Lund and Bushnell (1939) as being conducive to high egg laying by *T. confusum,* namely, one part of yeast, to four of flour.

The immature stages of both species of *Tribolium* are free in the food medium, consequently, by the use of correctly sized sieves, or silks, it was possible to isolate all stages of these insects from flour.

To obtain a large number of eggs of either species, many adult beetles were placed in flour for several hours, after which the flour was sieved, to isolate the eggs. Thus, the time of laying of the eggs was known fairly accurately. The eggs were then held in the incubator until hatching occurred.

Soon after hatching, the young larvae were placed in glass vials, 4 inches long by 1 inch diameter, each containing 5 gms. (dry weight) of the particular stock being tested. Twenty larvae were placed in each vial, and ten such vials were set up for each stock—that is, 200 individuals of each species were studied in each of the six stocks.

The vials were examined regularly, and, when pupae began to form, they were removed, recorded, sexed, and placed separately in small glass vials, 3 inches long by $\frac{5}{8}$th inch diameter.

The sexing was done at the pupal stage making use of the differences in the last abdominal segments, which were described by Good (1936) as being a "flat disk-like depression in the male, whereas in the female, there are two cone-like appendages, similar in appearance to the urogomphi, but much shorter and relatively thicker." According to both Good (op. cit.) and Park (1934) there were no external differences between the sexes in the adult stage. Hinton (1942), however, described a shallow oval pit, on the ventral side of the basal fourth of each femur, from which arises numerous erect hairs, in the males of *T. confusum,* and *T. castaneum,* but is not present in the females. This character,

TABLE 3.—DURATIONS IN DAYS OF STAGES OF TRIBOLIUM SPECIES IN SIX MILL STOCKS, TEMPERATURE 30° C. 75 PER CENT. R.H.

Stock Number.	Mean Incubation Period.	Larval Stage.			Pupal Stage.			Complete Life Cycle.		
		Max.	Min.	Mean.	Max.	Min.	Mean.	Max.	Min.	Mean.
				T. castaneum.						
1	4·0	29	16	18·5	10	3	5·6	38	25	28·1
2	4·0	38	18	21·6	12	3	5·3	48	27	30·9
3	4·0	54	22	35·4	7	4	5·6	63	31	45·0
4	4·0	32	17	20·4	7	3	5·9	41	27	31·0
5	4·0	24	13	16·9	10	3	5·4	35	23	26·2
6	4·0	19	14	16·9	6	4	5·7	29	24	26·5
				T. confusum.						
1	5·4	23	17	20·0	8	3	6·4	36	27	31·7
2	5·2	41	22	24·8	8	3	6·8	48	32	36·8
3	5·2	58	23	35·1	9	5	6·4	69	34	46·5
4	5·7	34	17	20·7	13	5	6·8	45	30	33·2
5	5·0	25	17	18·6	9	6	7·0	40	29	30·7
6	5·0	25	18	20·2	9	6	7·0	37	31	32·6

however, was too difficult to see to be used as a routine laboratory method for sexing large numbers of living beetles.

The pupae were also examined regularly until the adult beetles emerged. Thus, the complete life cycle of each individual insect was obtained.

Experimental Results

(1) Effect of different diets upon the complete life cycle of *Tribolium* spp.

The details of the life history of both species have been summarized in Table 3 on previous page.

Under the conditions of these experiments the incubation period of the eggs was four days for *T. castaneum* and approximately five days for *T. confusum*.

Stanley (1939) devised an ingenious piece of equipment by means of which the incubation periods of *Tribolium* eggs could be determined with great accuracy. However, in these experiments no attempt was made to determine this stage with any great degree of accuracy since the food responses, rather than the detailed biology of the insects, were being studied.

In both species the range in pupal periods was much the same, irrespective of the diet upon which the larvae had been feeding. The pupal period for *T. castaneum* averaged approximately 5·5 days and that of *T. confusum* approximately 6·5 days. No effect that could be attributed to the diet was observable in the duration of the pupal periods. A more exacting technique would need to be used if the significance of small variations in this stage was to be determined.

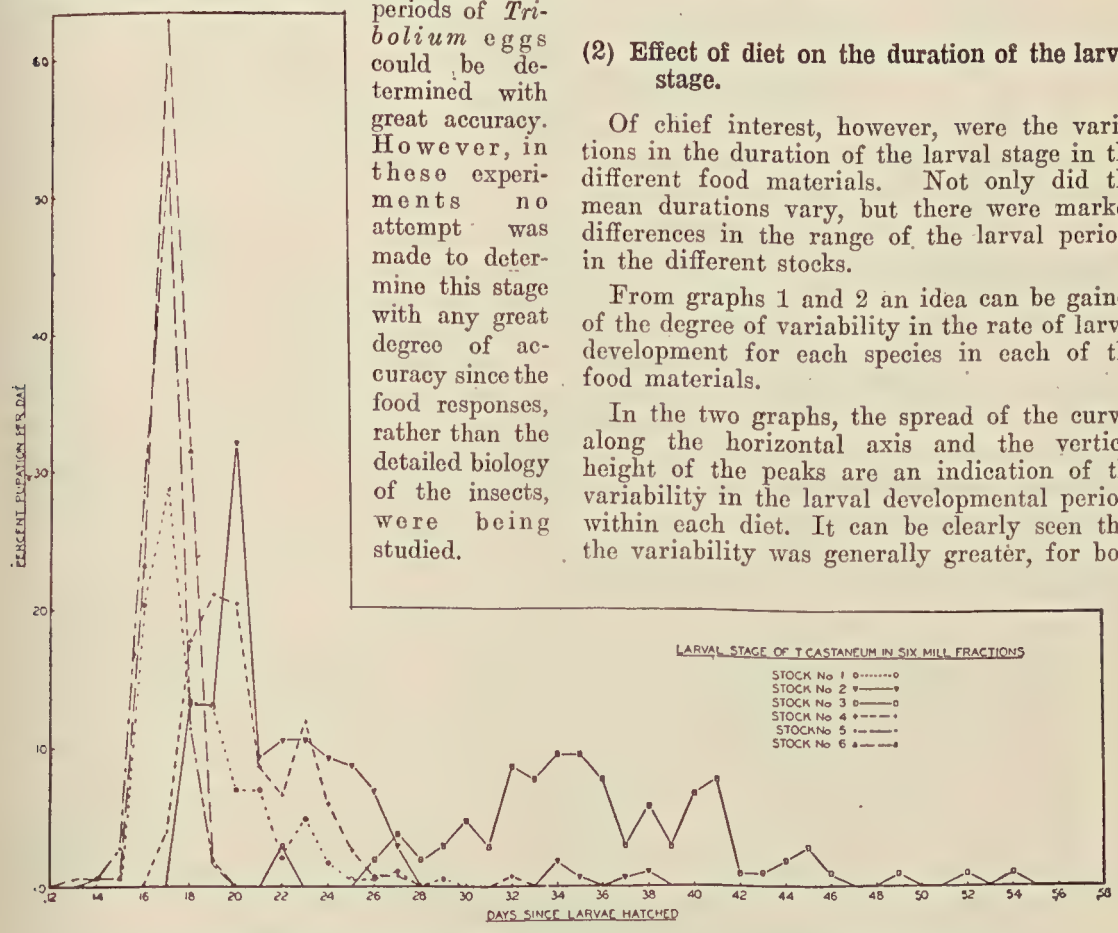
The complete life cycles of the two species showed wide variations, due, chiefly, to the variations in the rate of larval development in the different food materials. In general, the life cycle of *T. castaneum* was somewhat shorter than that of *T. confusum*—a fact that has already been recorded by Good (1933). The life cycle of *T. castaneum* ranged from 23–63 days and that of *T. confusum* from 27–69 days.

(2) Effect of diet on the duration of the larval stage.

Of chief interest, however, were the variations in the duration of the larval stage in the different food materials. Not only did the mean durations vary, but there were marked differences in the range of the larval periods in the different stocks.

From graphs 1 and 2 an idea can be gained of the degree of variability in the rate of larval development for each species in each of the food materials.

In the two graphs, the spread of the curves along the horizontal axis and the vertical height of the peaks are an indication of the variability in the larval developmental periods within each diet. It can be clearly seen that the variability was generally greater, for both



Graph 1—Distributions of larval developmental periods of *T. castaneum* in six mill stocks. Temp. 30° C. 75% R.H.

species, in the three white flours (stocks 2, 3 and 4), than in either crushed whole wheat (stock 1), or the two pollard fractions (stocks 5 and 6).

Similar information can be gained from Graphs 3 and 4 (page 370) where the numbers of larvae pupating and the duration of larval stages have been plotted as summation curves. The inclinations of the curves to the horizontal axis are an indication of the degree of variability. As the variability decreases the curves become steeper.

In Table 4, the complete details of the mean duration of the larval stage in each of the ten replicates in each stock are given together with the results of the statistical examination of the data by the method of analysis of variance.

Thus, with *T. castaneum,* the larval development was most rapid (16·9 days) in the two pollard fractions (stocks 5 and 6), significantly less so in crushed wheat (stock 1), and slower still in the three white flours (stocks 4, 2 and 3). The development in stock 3 was extremely slow, averaging 35·4 days.

In the case of *T. confusum,* the larval development was most rapid in stock 5 (18·6 days) and less so in stocks 1, 6, and 4 (20·0, 20·2 and 20·7 days respectively) and slower still in stock 2 (24·8 days) and in stock 3 (35·1 days). These responses differ somewhat from those obtained with *T. castaneum.* For example, there was a significant difference between the duration of the larval stage in stock 5 (a pollard fraction) and that in stock 6 (another pollard fraction) in the case of *T. confusum;* but in *T. castaneum,* larval development was equally rapid in these two food materials. Furthermore, the larval stage of *T. confusum* was of equal duration in one of

TABLE 4.—DETAILS OF MEAN DURATION (IN DAYS) OF LARVAL STAGES OF TRIBOLIUM SPECIES IN SIX MILL STOCKS, TEMPERATURE 30° C., 75 PER CENT. R.H.

Vial Number.	Stock No. 1.	Stock No. 2.	Stock No. 3.	Stock No. 4.	Stock No. 5.	Stock No. 6.
			T. castaneum.			
1	18·3	22·7	35·5	19·3	17·1	16·7
2	17·3	21·8	36·7	22·4	17·0	17·0
3	17·4	21·7	34·8	20·6	16·9	17·3
4	18·6	21·2	34·7	20·9	17·1	16·8
5	19·4	22·4	35·8	19·2	17·1	16·9
6	20·6	21·5	31·6	20·7	17·2	17·0
7	17·9	20·7	34·7	20·9	17·4	16·7
8	19·3	22·4	39·6	19·8	17·1	17·1
9	18·3	21·3	35·6	20·6	16·0	16·8
10	17·6	20·4	34·9	20·1	16·0	16·8
Mean	18.5	21.6	35.4	20.4	16.9	16.9

Least significant mean difference (5 per cent. level) = 0.9 days. (1 per cent. level) = 1.2 days.

			T. confusum.			
1	22·0	25·1	35·8	21·6	18·9	20·0
2	19·4	24·8	34·5	21·9	18·1	20·3
3	20·1	24·6	36·1	21·6	18·4	20·0
4	20·5	24·8	38·0	19·6	18·6	19·3
5	19·2	25·8	36·4	20·2	18·8	21·5
6	18·9	25·2	37·1	19·1	18·3	20·0
7	19·6	25·0	36·8	20·0	18·4	19·4
8	19·9	24·2	31·1	21·1	18·5	20·3
9	19·8	23·6	34·0	21·1	19·1	20·3
10	20·2	24·5	31·1	20·7	19·0	20·8
Mean	20·0	24·8	35·1	20·7	18·6	20·2

Least significant mean difference (5 per cent. level) = 1·1 days. (1 per cent. level) = 1·4 days.

the white flours (stock 4), as it was in crushed wheat (stock 1), or one of the pollard fractions (stock 6). With *T. castaneum,* however, the larvae did not develop as rapidly in any of the three white flours (stocks 4, 2 and 3) as in any of the other stocks.

On statistically comparing the durations of the larval stages of two species, in the same food medium, the larval development of *T. castaneum* was significantly more rapid than that of *T. confusum* in the three apparently more nutritive diets (stocks 1, 5, and 6), and also in one of the flours (stock 2). There was, however, no difference in the duration of the larval stage of the two species in each of the two remaining white flours (stocks 3 and 4).

The comparative responses of the two species in the same stock have been set out in Graph 5 (page 371).

(3) Effect of diet upon the larval survival of *Tribolium* spp.

Not only did the diet markedly effect the duration of the larval stage of both these species of *Tribolium;* but it was also observed that the proportion of the larvae completing their development varied widely in the different foods.

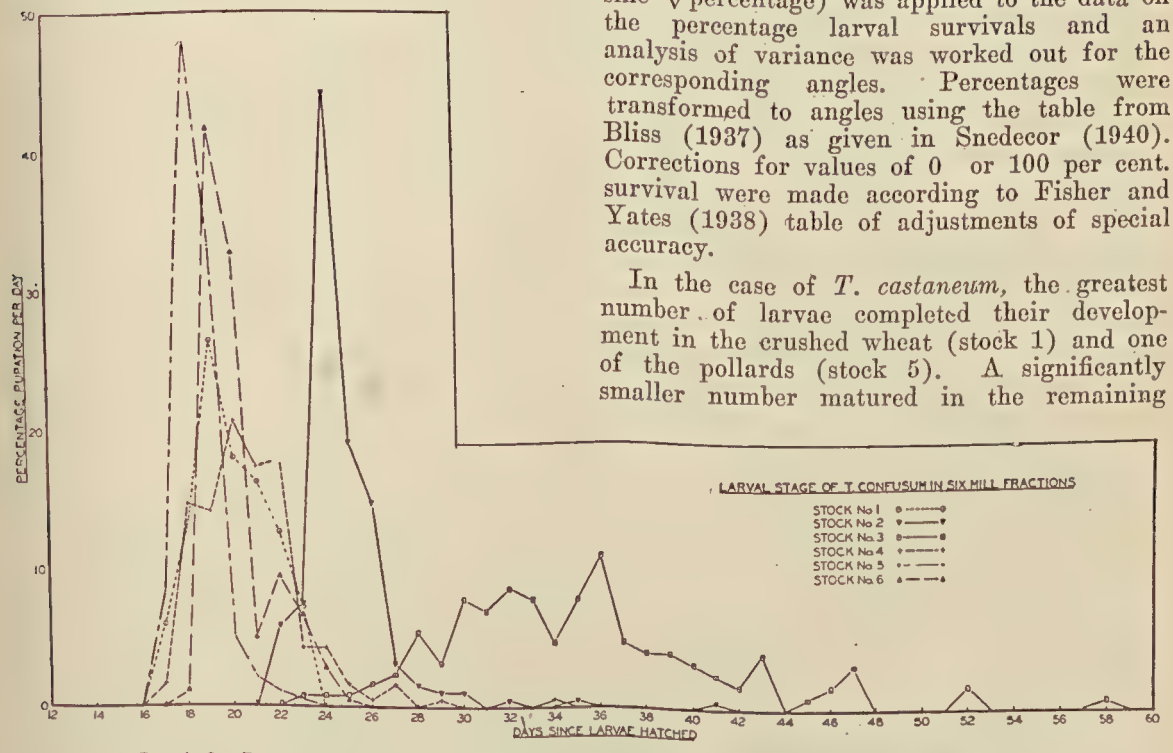
The mean percentage survival in each of the vials was determined and hence the mean figure for each species, in each of the six food media. These mean figures are shown in Table 5.

TABLE 5.—MEAN PERCENTAGE SURVIVAL OF LARVAE OF TRIBOLIUM SPECIES IN SIX FOOD MATERIALS.

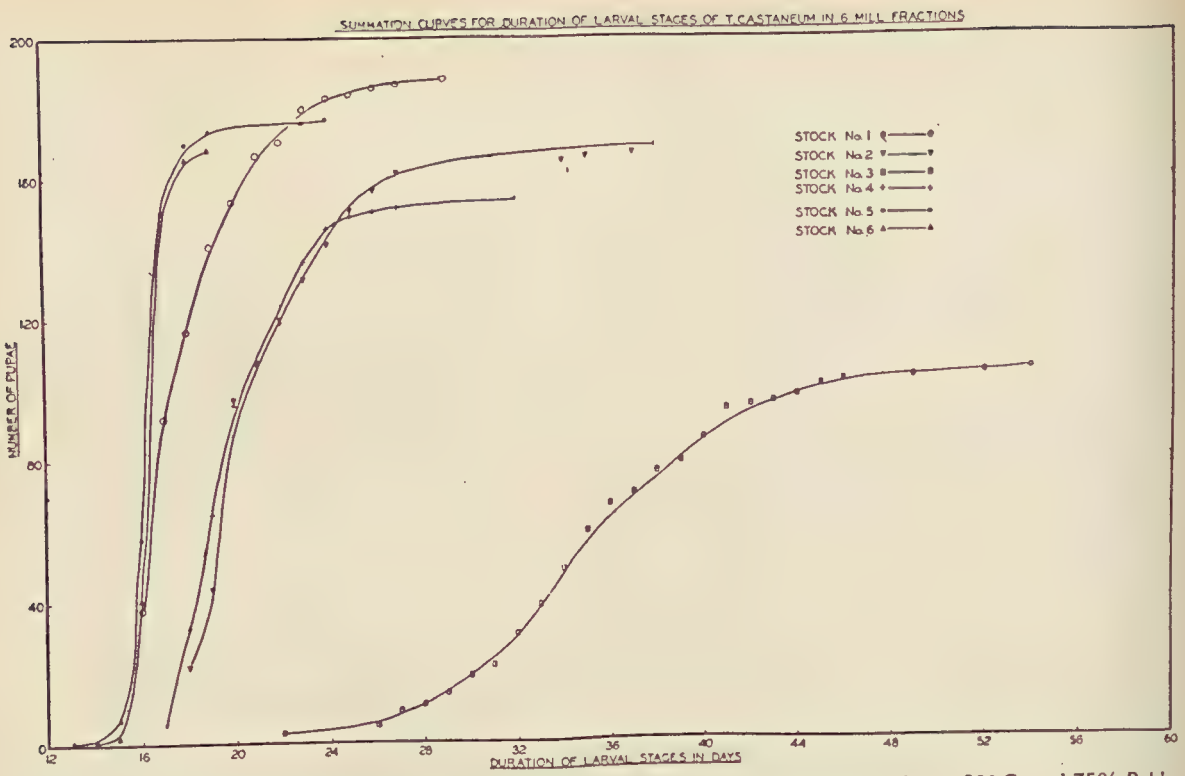
Stock No.	*T. astaneum.*		*T. confusum.*	
	Percentage Survival.	Angles Corresponding to Percents.	Percentage Survival.	Angles Corresponding to Percents.
1 ..	94·0	76·23°	85·3	68·14°
2 ..	84·5	67·34°	95·3	78·75°
3 ..	53·2	46·87°	67·4	56·16°
4 ..	78·6	62·84°	92·4	74·48°
5 ..	95·2	77·88°	96·0	79·00°
6 ..	84·8	67·84°	90·0	72·41°
Least significant mean difference (5 per cent. level) = 6·39°			(5 per cent. level) 7·31°	
Least significant mean difference (1 per cent. level) = 8·52°			(1 per cent. level) 9·75°	

An angular transformation (angle = arc sine $\sqrt{\text{percentage}}$) was applied to the data on the percentage larval survivals and an analysis of variance was worked out for the corresponding angles. Percentages were transformed to angles using the table from Bliss (1937) as given in Snedecor (1940). Corrections for values of 0 or 100 per cent. survival were made according to Fisher and Yates (1938) table of adjustments of special accuracy.

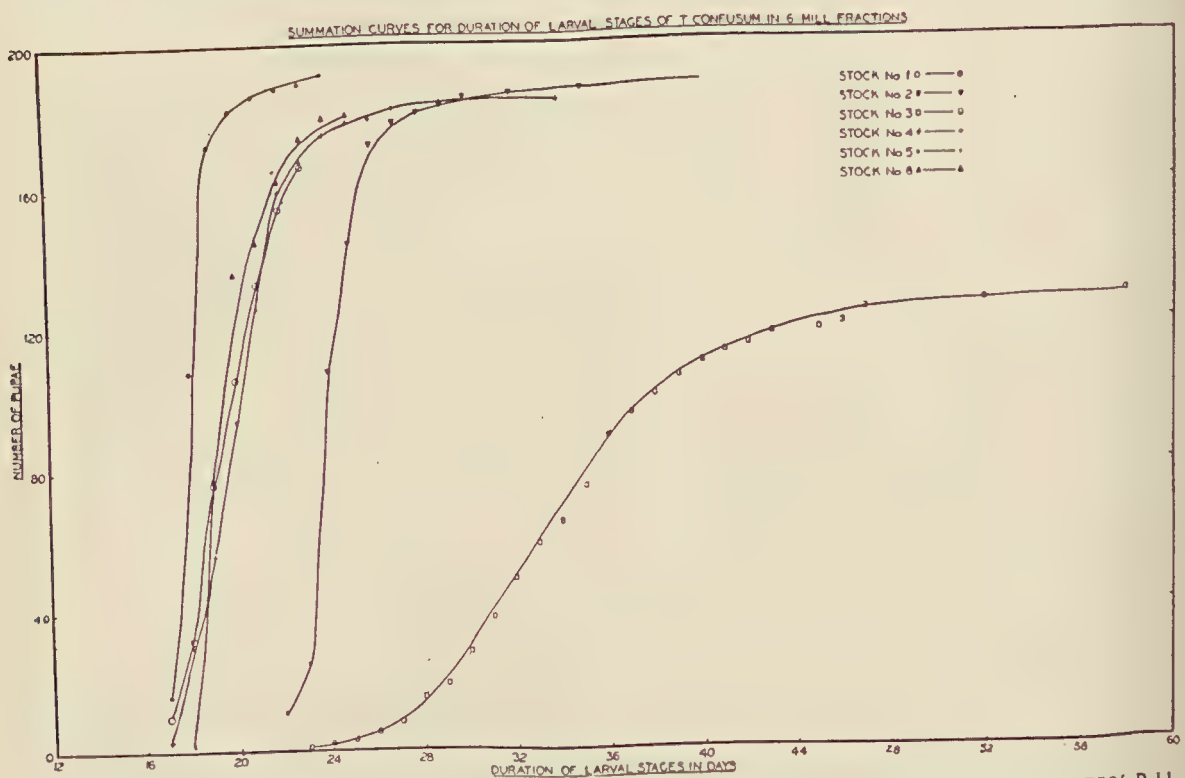
In the case of *T. castaneum,* the greatest number of larvae completed their development in the crushed wheat (stock 1) and one of the pollards (stock 5). A significantly smaller number matured in the remaining



Graph 2—Distribution of larval developmental periods of *T. confusum* in 6 mill stocks. Temp. 30° C. 75% R.H.



Graph 3—Summation curves of larval development of *T. castaneum* in six mill stocks. Temp. 30° C. and 75% R.H.

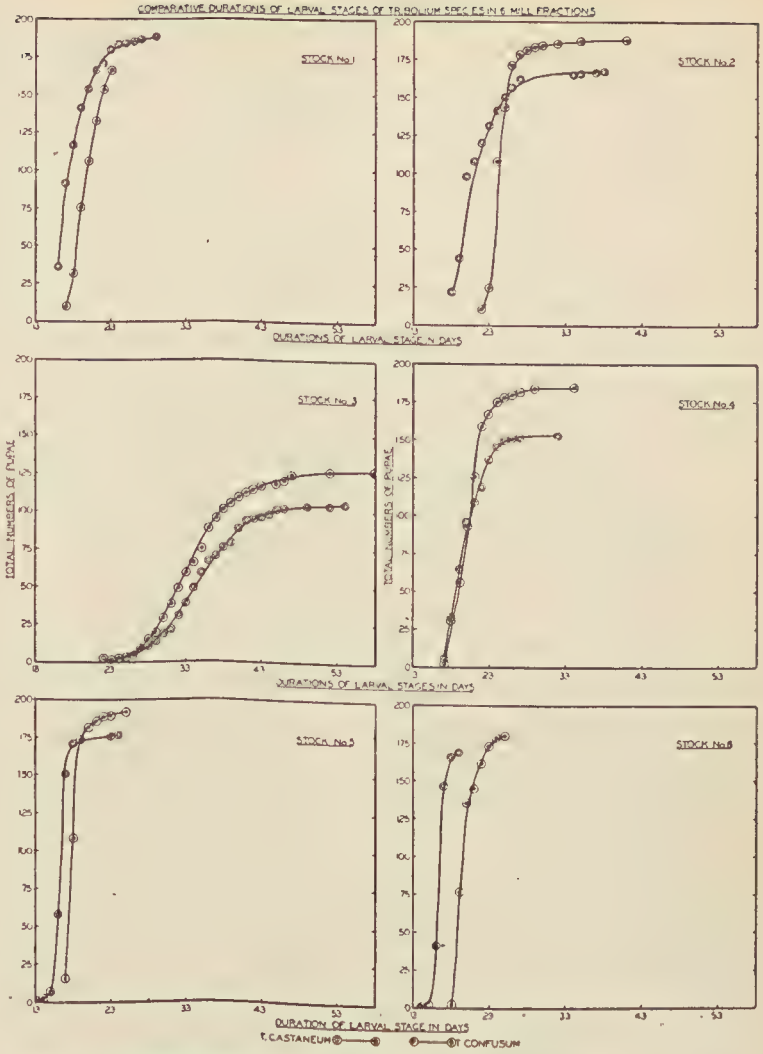


Graph 4—Summation curves of larval development of *T. confusum* in six mill stocks. Temp. 30° C. and 75% R.H.

pollard fraction (stock 6), and in two of the flours (stocks 2 and 4). In the remaining white flour (stock 3), only 53·2 per cent. of the larvae completed their development.

With *T. confusum,* there was less difference in the percentage survivals in the various food materials. For instance, over 90 per cent. of the larvae survived in both pollard fractions (stocks 5 and 6) and also in two of the flours (stocks 2 and 4). The survival in the crushed whole wheat (stock 1) was significantly less than in stocks 5 and 2, but there was no difference between the survival in stock 1 and in stocks 4 and 6. As with *T. castaneum* the survival of the larvae of *T. confusum* was least in the reduction flour, stock 3 (67·4 per cent).

On statistically comparing the larval survivals of the two species in each of the stocks, it was found that there was no difference between the species in either of the pollard fractions (stocks 5 and 6). In the crushed whole-wheat (stock 1) a greater percentage of *T. castaneum* larvae completed their development than did those of *T. confusum.* In the remaining three food materials—the three white flours (stocks 2, 3 and 4)—the percentage larval survivals were greater for *T. confusum* than they were for *T. castaneum.*



Graph 5—Comparative curves of larval development of *Tribolium* spp.

The variations in the numbers of larvae surviving to pupation can also be seen in Graphs 3, 4, and 5, where the vertical heights of the curves represent the total numbers of larvae pupating in each of the food materials.

(4) Effect of diet upon the proportions of the sexes.

The percentages of males and females of each species emerging in each of the six food materials have been summarized in Table 6.

Table 6.—Mean Proportions of the Sexes of Tribolium Species in Six Mill Fractions.

Stock No.	*T. castaneum.*		*T. confusum.*	
	Percentage Males.	Percentage Females.	Percentage Males.	Percentage Females.
1 ..	44·7	55·3	55·2	44·8
2 ..	57·7	42·3	47·9	52·1
3 ..	49·5	50·5	47·4	52·6
4 ..	51·6	48·4	44·6	55·4
5 ..	53·7	46·3	55·2	44·8
6 ..	53·3	46·7	49·4	50·6
Mean for all stocks	51·8	48·2	50·0	50·0

While certain variations did occur, in the proportions of the sexes present in both species, these did not prove to be significant on analysis. Furthermore, there did not appear to be any correlation between the sex of the insect and the duration of any of the stages of its development.

Discussion of Experimental Results

The two species of *Tribolium, T. castaneum,* and *T. confusum* have long been known to infest a wide range of stored products. Chittenden (1896, 1897) listed *T. confusum* as infesting a wide range of meals and flours, and Good (op. cit.) listed both species as attacking —"flour and all other prepared cereals products, grain and seed, animal matter especially dry specimens, yeast, nuts, dried fruits, chocolate, certain spices and other miscellaneous plant products."

With the exception of this work by Good, no detailed comparisons of either the biology or the food responses of these two species have been attempted.

The results obtained in these tests confirmed Good's observations that, in general, the durations of the stages of *T. castaneum* were somewhat shorter than those of the corresponding stages of *T. confusum.* Under the conditions of the experiment (30° C. and 75 per cent. R.H.) both the incubation period and the pupal period of *T. confusum* were each, approximately, one day longer than the corresponding stage of *T. castaneum.* No influence of the nutritive value of the diet could be observed in the durations of the pupal stage. This, of course, may have been due to the technique not being sufficiently precise to determine the significance of small variations.

The larval stages of both species, however, were markedly affected by the diet upon which the larvae developed. The development of either species was much more protracted in the white flours than on the more nutritive diets—(the crushed wheat and the pollard fractions). The fact that patent flours were less susceptible to insect attack has long been recognized in the milling trade, and Chapman (1918, 1924), Good (1936), Frankel and Blewett (1943) and others have recorded the slow rate of growth of *Tribolium* on white flour diets.

From these experiments, it was obvious that although both species were affected by the diet on which they were reared, the effect of a low nutritive diet was more marked with *T. castaneum* than with *T. confusum.* This can also be seen from the fact that, in the most nutritive stocks, the durations of the larval stages of *T. castaneum* were significantly shorter than those of *T. confusum* on similar diets. When, however, the durations of the larval stages of the two species were compared, on the least nutritive diet (stock 3), there was no difference in their developmental periods.

Added information, on the comparative inability of *T. castaneum* to grow and mature on a diet of low nutritive value was gained from the analysis of the larval survivals. Although the survivals of both species were much lower in the least nutritive diet (stock 3) the percentages of *T. castaneum* surviving on this white flour diet were significantly lower than the survivals of *T. confusum* in the same food. Furthermore, the survivals of *T. castaneum* larvae in all three white flours (stocks 2, 3 and 4) were lower than those of *T. confusum* in the corresponding media. In two of the more nutritive diets the percentage survivors were the same (stocks 5 and 6), and only on a diet of crushed wheat (stock 1) was the survival of *T. castaneum* greater than that of *T. confusum.*

It would appear, therefore, that *T. castaneum* was more sensitive than *T. confusum* to the nutritive value of the diet and also that flours of the type used in these tests were not satisfactory for optimum growth and survival of *T. castaneum.*

While there is little information available on the food responses of *T. castaneum,* those of *T. confusum* have been intensively studied. Chapman (1924) concluded that microorganisms did not play an important part in the nutrition of *T. confusum.* Fraenkel and Blewett (1943b) showed that although intracellular symbionts played no part in the nutrition of *T. confusum,* they were of extreme importance to *Lasioderma sericorne* (Fab.) and *Sitodrepa panicea* (L), since the symbionts appeared to provide some of the necessary B-complex vitamins necessary for the growth of these two species.

Since the responses of *T. castaneum* were somewhat similar in these experiments to those of *T. confusum,* it would appear that intracellular symbionts are unimportant in the nutrition of this species.

Sweetman and Palmer (1928) found that vitamin B was essential for the development of

T. confusum. More recently the food requirements of this species have been studied by Frobich (1939) and Fraenkel and Blewett, (1942B, 1943A). Frobich reported that all the necessary growth factors for *T. confusum* were present in extracts of yeast. Of the water soluble vitamins, thiamin, riboflavin and an unidentified factor (Bx) were necessary for growth. The optimum for both thiamin and riboflavin was approximately 6 gamma per 1·5 gms. of diet. Fraenkel and Blewett showed that *T. confusum* required the five major components of the B complex—B1, riboflavin, nicotinic acid, B6 and pantothenic acid, while choline chloride, inositol and p-amino-benzoic acid also appeared to be important. Biotin was also found to be necessary for *T. confusum* (Fraenkel and Blewett, 1942, A, B).

It has been shown that patent flours of low extraction are deficient in thiamin, riboflavin nicotinic acid, pantothenic acid and B6 (Andrews et al, Tepley et al, Thomas et al (1942). Frankel and Blewett (1941) proved that the deficiency of their particular patent flour as a diet for *T. confusum* was largely due to a riboflavin deficiency. On the other hand Barton-Wright (1941) found that the patent flour he used for *T. confusum* was deficient in thiamin and nicotinic acid as well as riboflavin.

From the results shown in Tables 4 and 5, together with the results obtained by others with *T. confusum* it would appear that the slower development in the white flours was due to deficiencies of B_1, and probably other members of the B-complex vitamins.

Furthermore, the larvae of *T. castaneum* were apparently more sensitive to deficiencies of B-group vitamins than were the larvae of *T. confusum*.

No evidence was obtained from these experiments that the sex of either species was influenced by the diet upon which the larvae were fed. No attempt was made, however, to determine whether actual starvation would have a similar influence upon the sex of *T. castaneum*, as was reported by Holdaway and Smith (1933) for *T. confusum*. This latter species was found to produce an excess of females following starvation of the newly-hatched larvae for 2–3 days.

Summary

An investigation of the comparative food responses of two species of the genus *Tribolium* was undertaken following the discovery that, although the rust-red flour beetle, *T. castaneum* (Hbst.), was the dominant species of the genus in wheat in Victoria, the confused flour beetle, *T. confusum* (Duv.) was the most prevalent species in flour mills.

The life cycle of *T. confusum* was somewhat longer than that of *T. castaneum* under the conditions of the experiments—i.e., a temperature of 30° C. and a relative humidity of 75 per cent.

The durations of the larval stage of both species were greatly prolonged on a diet of white flour of low extraction, probably because of the deficiency of some or all of the B-complex vitamins.

The larvae of *T. castaneum* matured quicker than those of *T. confusum* on the more nutritive diets; but were shown to be more sensitive to a deficient diet than the larvae of *T. confusum*. This greater sensitivity of *T. castaneum* larvae was also shown in the higher proportion of individuals that failed to complete their development on the white flour diets.

The survival of *T. castaneum* larvae on a diet of crushed whole-wheat was greater than that of *T. confusum*.

The similarity in the general food responses of the two species suggested that intracellular symbionts were as unimportant in the nutrition of *T. castaneum* as they were in that of *T. confusum*.

No relationship was established between nutrition and the sex of either species.

These experiments have shown that the environment within a flour mill would tend to favour the larval development and survival of *T. confusum* more than that of *T. castaneum*.

Acknowledgments

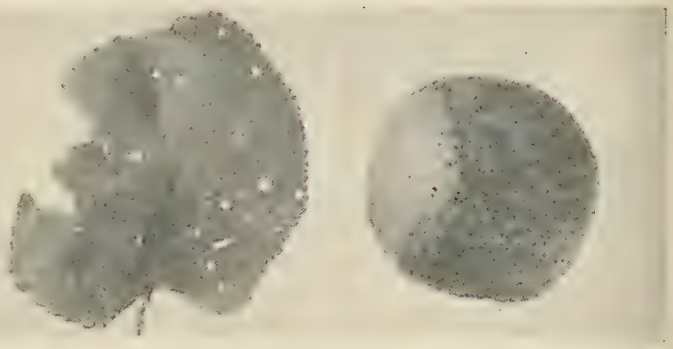
The mill fractions, with which the tests were conducted, were generously supplied by W. S. Kimpton & Sons, flour millers, Kensington. Mr. R. W. Bottomley, chief chemist of that company, not only collected and analysed the six mill stocks used, but willingly co-operated in many other aspects of the investigation. His invaluable assistance is gratefully acknowledged.

[*Continued on page* 377.

IN THE ORCHARD

Contributed by the Horticultural Division

WITH the bursting of buds of fruit trees in the spring, the soft new growth which appears is very susceptible to attack by various fungous diseases which are prevalent at this time of the year. Sprays are necessary to protect this young growth by destroying germinating fungal spores.



Leaf and fruit injury of apricot due to Apricot Scab ("Shot hole.")

Peach Leaf Curl

Peach leaf curl can be very destructive in a year which favours its development. The symptoms of the disease are a curling and thickening of the leaves and, in severe infections, new growth becomes distorted. This is particularly unfortunate in the case of young trees, because the shape of the tree may be spoiled. Provided that the trees are sprayed with Bordeaux mixture at the right time, no trouble should be experienced with this disease. A 6:4:40 strength Bordeaux spray should be applied between the time when bud movement occurs and the first pink colour of the petals appears. Once the symptoms appear on the leaves no satisfactory control is possible; therefore, spraying at the correct time is essential for freedom from this disease.

Apricot Scab

Apricot Scab, a disease of apricots, is also known as "shot hole" because of the numerous small holes which appear in infected leaves. The most serious effect, however, is the occurrence of brown scaly spots on the fruit, which spoil the appearance and thus render it unsuitable for canning or jam-making. Autumn spraying, which has already been recommended, should be followed by a 6:4:40 Bordeaux spray at the "pink" stage, i.e., when the first tinge of pink appears on the opening buds.

Black Spot in Pears

Adequate spray protection is required for the opening buds of pears against the spores of black spot. Bordeaux mixture is the most effective fungicide for this purpose. Because of the varying susceptibility of various varieties to copper sprays, different schedules are required. For Williams' and Beurre Bosc pear trees, the full strength schedule may be applied. Apply 6:4:40 Bordeaux at the "green tip" stage, i.e., when the tips of the young leaves are visible in the opening buds and again at the "finger" stage, i.e., when the clusters of blossom buds are commencing to separate, but before the white petals appear. A further spray, strength 3:3:50, should be given at a stage about three weeks after petal fall.

For the varieties, Josephine and Winter Cole, only one Bordeaux spray should be applied at an early "green tip" stage.

The Winter Nelis and Madame Cole varieties should be sprayed with the same schedule as for Williams', but the "finger" spray should be completed before any pink petals appear. The same schedule is required for Packham's and other clean-skinned varieties, except that the calyx spray should be reduced to 1:1:50 strength.

The spores of the black spot organism are ejected from old infected leaves lying around the trees. The spore discharge is greatly increased if the leaves are stirred by ploughing. It is advisable, therefore, to complete the ploughing before bud burst and bury infected leaves, but if this is not possible, delay this operation until after flowering.

Preparation of Bordeaux Mixture

The full strength Bordeaux mixture formula is given as 6:4:40, which means that 6 lb. of copper sulphate and 4 lb. quicklime are used for 40 gallons of spray. If slaked lime is used instead of quicklime, the quantity should

be increased by 1½, i.e., use 6 lb. slaked lime in the above formula. To obtain a finely-divided spray, dissolve 12 lb. copper sulphate crystals in water and make up to 72 gallons in the spray vat. Mix 8 lb. quicklime or 12 lb. slaked lime with 8 gallons water and slowly add this to the copper solution in the vat with the agitators in motion. The quickest way of dissolving crystalline bluestone is to place the desired quantity in a bag and suspend it near the surface of the water in a wooden barrel. Finely divided "snow" crystals are specially prepared to dissolve quickly and can be put straight into the vat and dissolved by stirring with the agitator. However, care should be taken to make sure that the crystals are completely dissolved before the lime is added.

IN THE GARDEN

By J. L. PROVAN, B.Agr.Sc., Principal, School of Horticulture, Burnley Gardens

Honeysuckles

THERE are a number of varieties of honeysuckles, some definitely climbing plants while others are more shrubby in their habit of growth. Many are evergreen or partially evergreen in our climate, while others are deciduous. The majority have fragrant flowers which earn for themselves a place in the garden.

One particular species—*Lonicera nitida*—has small box-like foliage and a dense, compact habit of growth. It is ideal for growing as a small specimen shrub or for training as a small hedge, as it seldom exceeds 3 feet in height. It has very small, creamy, fragrant flowers in the summer.

A deciduous honeysuckle is *L. tartarica rosea* which grows to a height of about 5 feet. The pink flowers are usually produced in early spring. *L. fragrantissima* is one of the partially evergreen Chinese honeysuckles which grows in a shrubby fashion somewhat spreading, and bears sweetly fragrant, cream-coloured flowers in June and July.

There are several fine climbing honeysuckles. *L. caprifolium,* sometimes called the European Honeysuckle, has rather large fragrant creamy flowers tinged with pink. *L. Periclymenum belgica,* is a form of the common Wild Woodbine, and this particular form is sometimes called the Early Dutch Honeysuckle. The flowers are fragrant and are deep red and yellow in colour. A hybrid honeysuckle, *L. Heckrottii,* has fragrant orange-yellow flowers which are shaded with a purplish crimson. This is a good evergreen climber.

All the species mentioned above are hardy and will readily grow in any rich, moist, well-drained soil. One honeysuckle which is more tender and semi-evergreen, is the Burmese species—*L. Hildebrandiana.* It is a good vigorous growing climber, but prefers a rather sheltered position. It grows well in the hills, and produces its bright yellow flowers, which are usually 4 inches long, in conspicuous clusters.

Small Shrubs for Sunny Places

Recently the writer was asked to suggest some small shrubs which would be suitable for the front of a shrubbery with a sunny aspect. Although there is a great number of shrubs suited to this position, it is possible to include a few suggestions only in these notes. For such a position some Polyantha roses would be very suitable, and the following varieties suggest themselves:—*Ellen Poulsen,* a double, bright rose pink flower, with a pleasant perfume; a strong grower. *Gloria Mundi* with brilliant orange scarlet flowers on a compact bushy plant. *Karen Poulsen*—this rose has brilliant scarlet flowers which, although single, are abundant and provide a good splash of colour in the garden. *Sparkler* is a deep rich red with double flowers and a sturdy habit of growth. *Tip Top* has coppery yellow and pink flowers which are abundant.

A small free-flowering shrub with deep blue flowers, which seldom grows to a height of more than 3 feet, is *Ceratostigma Willmottiae.* This deciduous shrub should be pruned hard at the end of winter.

Agathaea coelestis, the Blue Marguerite of South Africa, grows to a height of about 2 feet, and is very hardy, with a compact habit of growth. It is evergreen and its blue daisy-like flowers are produced practically throughout the year.

Some of the Rock roses, as they are called, are particularly suited to dry, hot locations. One of these—*Cistus purpurea,* var. *Brilliancy*—has rose crimson flowers with a crimson-maroon blotch. Another variety, *Sunset,* has rich magenta pink flowers.

Cuphea ignea, the Cigar Plant, so called because of its small cigar-shaped red and black flowers borne freely along the stems, is a pleasing compact shrub. It requires to be pruned at the end of winter.

The sweet scented Boronia, *B. megastigma,* makes a small and compact plant and its popular fragrant brown and yellow flowers are produced in the spring. Under normal gardening conditions it is not an easy plant to grow; it likes virgin soil and should be pruned hard during or after each flowering.

Symphoricarpus vulgaris, the Indian Coral plant, has long sprays of graceful foliage which turn to pleasing autumn shades as winter approaches, and the small crimson raspberry-like fruits are borne along the slender stems. After the bush has attained a height of about 2 to 3 feet the new growth should be cut back to about 18 inches from the ground in the early spring. The fruit is borne on the new wood produced in the spring and summer.

Hypericum patulum Henryii is a bushy shrub with attractive foliage and handsome golden flowers, often 2 inches in diameter. Another, *H. Moserianum tricolor* has bright green, cream, and pink foliage and yellow flowers.

Some other small shrubs which are suitable for the forefront of the borders, but which cannot be described in detail in these notes are —*Chorizema cordata, Genista tinctoria, Lavandula vera* (Lavender), *Felicia angustifolia, Cotoneaster horizontalis, Cotoneaster horizontalis* var. *Hodginsii, Lantana Sellowiana, Jasminum nudiflorum, and Euphorbia Wulfenii.*

THE VEGETABLE GARDEN

Peas

Peas may be sown this month. Prepare the soil well by digging in well-decayed manure or compost and applying superphosphate at the rate of 2 oz. to the square yard at the time of digging. It is a much better practice to dig this manure well under than to place it in the drill with the seed. In poorer soils use market garden manure at the rate of 3 oz. to the square yard in place of the superphosphate. For good results the beds should be raised above the level of the paths; spring rains are often heavy and the pea plant likes a well-drained soil. If the soil is badly drained the peas will rot or growth will be retarded.

The following varieties are suitable for planting at this time—*Melbourne Market, Greenfeast,* and *Richard Seddon.* The simplest method of planting the seed is to make drills to a depth of 2 to 3 inches along the length of the bed and space the seed at intervals of 2 to 2½ inches. Cover the seed with not more than 2 inches of soil. Rows should be spaced about 18 inches apart. As soon as the seed germinates, protection of the young shoots from sparrows may be necessary. These birds are very fond of the young green tips when they appear above the soil.

Leeks

Another planting of leeks can be made this month. Space the rows 20 inches apart and allow 6 inches between each plant. It is usual to plant these in a trench about 6 inches deep, and then as the leeks grow the soil is pulled down into the trench to assist in blanching the stems. In this way, long white stems are produced. Suitable varieties were mentioned last month.

Red Beet

Seed of red beet can be sown in well-prepared soil. Red beet prefers a rather open soil with plenty of lime, and this material should be added at the rate of about 6 to 8 oz. to the square yard, and lightly forked into the surface soil.

A good early variety which produces rather a flat beet is *Crosby's Egyptian.* Other varieties are—*Detroit Dark Red,* which is one of the most popular at the present time because of its intense colour and its freedom from white rings when cut; *Crimson Globe* and *Derwent Globe.*

Space the rows about 12 to 18 inches apart, and put one or two seeds at intervals of 3 inches apart. Cover with about ¾ inch of soil. Thin to single plants as soon as the young seedlings are large enough to handle.

Turnips

Turnips can be sown in drills which are spaced about 12 to 18 inches apart, and the usual practice is to sow a thin strip of seed along the drill. Cover this to a depth of about ¼ inch and when the plants are large enough thin them out to 3 or 4 inches apart. Do not sow the seed too thickly, as the thinning process can become rather tedious.

White Stone and *Purple Top Munich* are two good varieties.

Potatoes

Early potatoes can be planted from the middle of the month onwards. Before planting, the seed tubers, which should be about 2 oz. in weight, should be placed in a sunny, dry position, sheltered from frosts, in order to "green" and sprout. Sprouted seed gives much better results than unsprouted. Early this month place the seed in shallow trays or on bags in a light, airy position, and by the end of the month it should be ready for planting. Endeavour to get certified seed free from virus diseases.

Good varieties for planting at this time of the year are *Carman No.* 1, *Katahdin, Manistee,* and *Earliest of All.*

Prepare the soil by digging in a mixture of six parts of superphosphate and one part of sulphate of ammonia, at the rate of 3 oz. to the square yard. Plant the seed in rows 24 inches apart and space the plants 15 inches apart in the rows. The seed (tubers) should be planted at a depth of 4½ to 5 inches.

INEVSTIGATIONS OF THE FLOUR BEETLES, ETC.—*continued from page 373.*

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NOTE.—Received for publication 10th May, 1944.

The Importance of Vegetables in the Diet—Methods of Preparing

By RUTH BROMFIELD, Assistant Fruit Preserving Expert

VEGETABLES play a big part in the maintenance of health because of the vitamins and minerals they contain. As these vitamins and minerals are easily lost in the cooking, every care should be taken to retain them.

The first essential is that the vegetables shall be cooked in as fresh a condition as possible. When leafy vegetables wilt, their vitamin content is greatly diminished, and to avoid such wilting it is best to wrap them in damp paper, if they are to be kept for a number of days. Vegetables stored in this way may be revived in cold water, but it is better not to soak vegetables at all. Simply wash them thoroughly just before cooking.

Shredded tender cabbage mixed with grated carrot and salad-dressing makes a tasty sandwich filling

Vegetables should be cooked in the shortest possible time, and to this end should be diced or cut into small pieces. Carrots, turnips, beetroot, celery and parsnips look most attractive when diced or cut into strips. Beans have much more flavour if, instead of being shredded to paper-like fineness, they are snapped or cut into inch pieces after stringing. Cabbage should be shredded before cooking, while cauliflowers should be broken into flowerettes. Beetroot has a brighter colour if scraped, cut into dice and cooked with two or three cloves and peppercorns.

Vegetables should be placed straight into boiling water, which should be kept boiling until they are tender.

The minimum amount of water should be used, and when the vegetables are cooked there should be little water left. Root vegetables require more water than leafy ones.

The lid should always be left on the pan; this will assist in the retention of vitamins and the colour of the greens.

Vegetables lose their value if not eaten immediately and for this reason should not be kept heated for long periods after cooking but served as soon as they are tender. Vegetables that require longer cooking should be put on first and the greens left until about fifteen minutes before serving.

The addition of bicarbonate of soda to brighten the colour of greens to some extent destroys the vitamins. If vegetables are cooked as described, however, their natural vitamins and colour will be retained. Old, tough vegetables should not be used as they cannot be made palatable or to retain their food value whatever method of cooking is used.

Peas will be full of flavour, tender and bright in colour, if placed in boiling water with a teaspoonful of sugar, a sprig of mint, and two or three pea pods. It is best to add the salt just before draining, otherwise if added at the beginning it is inclined to toughen them.

Any liquid that remains at the end of the cooking should never be discarded as it contains a valuable part of the mineral content of vegetables. It may be added to soups or any dish where stock is required.

Tomato juice and the juice of swede turnips and carrots, obtained by grating and squeezing the vegetables through muslin, will supply the need of infants and young children for vitamin C.

For the older children, shredded raw cabbage should be included in sandwiches, preferably mixed with grated carrot, and salad dressing. Parsley is rich in Vitamin C, and can be added to any savoury food, increasing the food value as well as improving the flavour.

When there are no green vegetables available, use may be made of plants such as sorrel, dock, nettles, dandelions, and lucerne. All are palatable and are hardly distinguishable from spinach. To prepare, gather fresh, remove the leaves from the stems and wash thoroughly. Put in a pan without any additional water other than that adhering to the leaves, and cover with a well-fitting lid. The addition of a sprig of parsley, marjoram, and thyme is an improvement. Shake the pan about occasionally and cook until the leaves are tender (about 10 minutes). Drain, add salt and pepper, a few shakes of grated nutmeg and a dot of butter. Nutmeg is a delightful flavouring to cauliflower, mushrooms and spinach.

Steaming is the most satisfactory way of cooking vegetables, provided the water is boiling before the vegetables are added and the water kept boiling. Little of the goodness is lost in the water and stove space and washing up are saved. With some vegetables, such as peas and beans, it is a good idea to put them in boiling water for 5 minutes to start them.

Potatoes are far nicer steamed. The jackets should always be left on potatoes during the cooking as this prevents the loss of minerals and vitamins. They should be included as often as possible in the diet. Baked in their jackets and stuffed with cooked meat they are a pleasant addition to a lunch. When baking, potatoes should be smeared with fat and sprinkled with salt before being placed in the oven slide. Vegetables cooked according to these rules have infinitely more flavour than those cooked by the old method.

To avoid monotony the cook should endeavour to vary the flavouring and method of cooking as much as possible.

Potatoes which are served at least once a day can be varied even when mashed by adding chopped chives or parsley before serving. Grated cheese, left-over tomato puree, or sauce can be mixed in by way of a change.

When the oven is being used for either the meat or sweets, the vegetables should be cooked in the oven either in a casserole or baked. Potatoes are delicious if sliced, put in a greased pie-dish, covered with milk, and seasoned with salt, pepper, and a little butter. The dish should be covered for about half an hour and the lid then removed to brown the potatoes.

Sweet potatoes provide a welcome variation to the menu. They may be baked in the dish with a roast, or sliced and boiled, then mashed and seasoned with butter and pepper. For a special flavour, after they have been beaten smooth, mix in a sauce made of 1 teaspoon of butter, 4 tablespoons of brown sugar, and 2 tablespoons of milk, brought to the boil.

Carrots can be varied by adding chopped mint or parsley or a tablespoon of fine-chopped fried onion before serving. Or equal quantities of diced carrots and green peas can be added to a white sauce.

Vary the sauce of cauliflower by the addition of nutmeg or cheese. Red beets, used as a hot vegetable, are improved by serving with a sauce made by cooking 1 tablespoon of cornflour, ¼ cup of sugar, ½ cup of vinegar, ¼ cup of water and salt together for 5 minutes. A teaspoon of grated orange rind could be added. Also the green leaves of the beet can be cooked as for spinach.

Savoury Scalloped Artichokes.—

2 cups diced boiled artichokes,
1 cup bread seasoned with herbs,
1 cup parsley sauce,
Pinch of nutmeg,
1 tablespoon grated cheese.

Moisten the seasoning well and bake or toast and cut into cubes. Add the sauce to the artichokes. Heat well and add the pinch of nutmeg and sprinkle with cheese.

Browned Vegetable Loaf.—

1½ cups grated carrot, 1 cup chopped celery, ½ cup grated parsnip, ½ cup grated turnip, ½ cup breadcrumbs, 1 cropped onion, 1 tablespoon flour, 2 eggs, 1 cup of milk or stock, 1 teaspoon salt, ¼ teaspoon pepper, 1 teaspoon fresh or dried herbs, browned breadcrumbs.

Combine the vegetables, breadcrumbs, flour, beaten eggs, milk and seasoning. Turn into a greased loaf tin liberally sprinkled with browned breadcrumbs. Bake in moderate oven for about 50 minutes.

Certified Pullorum Tested Flocks

A certified Pullorum Tested Flock is one in which all the breeding stock have given a negative reaction to the agglutination test for pullorum disease, and in which all such stock are kept under rigid conditions of isolation approved by the Chief Veterinary Inspector.

The undermentioned flocks have been certified by the Department of Agriculture, and will remain so until the next breeding season or until such time as the Chief Veterinary Inspector determines.

Full particulars of this scheme appeared in the February, 1942, issue of the *Journal of Agriculture*.

Application forms are obtainable from the Chief Veterinary Inspector, Department of Agriculture, Melbourne, C.2.

Owner.	Number of Birds.
Abikhair, E., 41 Wilfred-road, Ivanhoe, N. 21	33
Archard, N. F., Yeoburn East, via Kerang	181
Armstrong, D. M., Fryer's-road, Campbell's Creek	199
Ashgrove Stud Poultry Farm, Mountain-road, Cockatoo	158
Bantick, H. M., Old Dandenong-road, Heatherton	555
Barastoc Experimental Farm, Central-avenue, Bayswater	229
Barlow, M., Everest-crescent, Olinda	41
Barnes, Mrs. A., "The Heights," Blackburn-road, Blackburn	2,333
Bartholomew, G., St. Arnaud	92
Bartlett, N. M., Pimpinio	338
Bassett, R. A., South Muckleford	143
Batten, J. H., Central-avenue, Bayswater	672
Beer, Mrs. E. V., Rainbow Lodge, South Kyneton	96
Bentley, E. W., Hastings-road, Frankston	1,080
Best, G. W., Elmhurst-road, Bayswater	166
Bingley, A., 333 Highbury-road, Burwood, E.13	213
Blyth Bros., Rowson-road, Bayswater	166
Chapman, Mrs. E., Youanmite	237
Christie, Messrs. R. R. and Son, St. Elmo Poultry Farm, Bentleigh	895
Clark, H. N., Bayswater-road, Croydon	2,262
Clegg, R. M., 52 Burns-street, Hamilton	55
Coats, C. J., Donald	70
Coupar, J. E., Nathalia	298
Crowle, L. Z., "Monomeeth", Broadford	165
Cumming, H. D., "Larneuk", Naroghid	75
Davidson A., 22 Sherbrooke-avenue, Ringwood	98
Davies, L. H., Westall-road, Springvale	291
Dawson, R. G., Maldon-road, Castlemaine	504
Dimmine, W. and Son, Heatherton-road, Noble Park	407
Dookie Agricultural College, Dookie	389
Eastaugh, T. L., Point Nepean-road, Highett, S. 21	345
Eastman Bros., Messrs., 52 Landell's-road, Pascoe Vale, W.8	1,732
Elliot, L. J., Blake-street, Nathalia	72
Elson, H., "Osborne", Mornington	104
Emmott, J. T., Verdun-street, Inglewood	212
Evans, Mrs. R., 50 Simpson-street, Kyneton	50
Everard, H. L., Hawkesdale	422
Fitchett, C. W. Springvale-road, Tally Ho	548
Forbes, Mrs. R., Pental Island, c/o Swan Hill P.O.	294
Gartner, Miss M. T., 259 Middleboro-road, Box Hill	56
Giovanetti, G. E., Skene-street, Kennington, Bendigo	98
Goddard, Wm. J., 356 High-street, Bendigo	158
Graham, C., "All Black Poultry Farm," Portarlington	45
Grant, D., 6 Laurel-grove, Blackburn	63
Greenshields, E. J., Lancefield	431
Greenwood J., Canterbury-road, Forest Hill	193
Gregson, Mrs. E., Kyvalley	194
Gwyther, R. P., Valley-road, Highton, Geelong	348
Hall, R. H., Wal Wal	370
Hamblin, N. A., "Sunny Hill" Poultry Farm, Toolleen	1,441
Hamilton, A., "Lyncroft", Flinders	321
Hansen, Mrs. M. A., Katandra West	100
Hayes, R., Mt. Dandenong-road, Montrose	217
Hearse, Geo. E., Narre Warren North	76
Hemphill, A. E., "Glenara Poultry Farm", Monegeeta	521
Henderson, C. W., Shepparton East	448
Hewett, A. T., Central-avenue, Bayswater	470
Hewitson and Phelan, "Golf House," Healesville	157
Hewitt's Poultry Farm, Skene-street, Bendigo	1,056
Hill, A. E., 26 Brenbeal-street, Balwyn	125
Hines Bros., Traynor's Lagoon, via St. Arnaud	970
Hipwell, Mrs. M., Maffra	99
Hockley, N. O., Coleraine-road, Hamilton	41
Howard, A. P., Brookvale, Kyneton	442
Howden, Mrs. R., High-street, Traralgon	92
Hunt, R. R., 365 Highbury-road, Burwood, E. 13	821
Jackson, Messrs. C. and H. G., Cadles-road, Carrum Downs	300
Johnson, A. S., Burwood-road, Lower Ferntree Gully	1,235
Kidgell, L. L., 34 Mullum-road, Ringwood	234
Kosch, E. W., Coromby	397
Kostos, D., Cr. Waverley and Collins roads, Oakleigh	658
Langton, Mrs. J., Croydon-road, Bayswater	36
Lawrie, Mrs. M., 107 Albert-street, Sebastopol	231
Lennie, Mrs. J. E., "Dumbarton," Mount Scobie, via Kyabram	225
Lucas, G., 4 Downing-street, Blackburn	923
MacKintosh, Walter C., Neerim South	365
Maclean, Charles C., Kelvinside-road, Noble Park	125
McDonald, J., 43 Bloomfield-avenue, Maribyrnong	92
McDonald, J. L., Lyons-road, Croydon North	288
McLaughlin, K. A., Dandevue Poultry Farm, Bayswater	793
McLaughlin, S. E. V., "Sutton Park," Hull-road, Croydon	191
McLeod, Miss K., "Hayfield," Digger's Rest	93
McNamara, O. J., 24 Sherbrooke-avenue, Ringwood	1,105
Maher, Allan E., "Alandale", Wal Wal	772
Mair, W. P., Tyabb	43
Major, W. R., Girgarre	105
Mead, J. L., 28 Golf Links-avenue, Oakleigh, S.E. 12	52
Meager, E., 12 Kennedy-street, Bendigo	21
Messenger, C., 240 Rathmines-street, Fairfield, N. 20	136
Miceli, Mrs. G., Monbulk	110
Moller, F. C., Warburton-road, Lilydale	48
Molson, W. E., 188 Blackburn-road North, Blackburn	649
Moore, H. A., Warrandyte-road, Ringwood North	660
Mumford, L. J., Steele-street, Healesville	348
Mynott, J. B., Bridgeland Park Estate, Main-road, Eltham	102
Nemet, P., Spring Vale-road, Spring Vale South	1,107
Nichols, Mrs. E. M., Yan Yean	662
Orange, Mrs. C., Marong	170
Pearse, Mrs. H. F., Box 33, Donald	339
Pobjoy, J., Patterson-road, Springvale South	523
Poole, A., Hull-road, Mooroolbark	318
Poulton, A. W., Vickers-street, Sebastopol	1,077
Rae, J., 277 Albert-street, Sebastopol, Ballarat	729
Ridge and Son, 42 Myrtle-grove, Blackburn	1,056
Ridgway, Geo., Callander-road, Noble Park	155
Robbins, R. B., Derby	83
Robson, F., 16 Nelson-street, North Wonthaggi	12
Rushton, J. A., 11 Barker-avenue, Shepparton	609
Salmond, J. B., Deer Park	120
Sanders, A., Stud-road, Wantirna	373
San Miguel, Mrs. M. H., Woodhouse-grove, Box Hill	2,253
Scouller, R. C., Tarrant-street, Cobden	243
Seear, W. "The Ranch," Station-street, Wesburn	195
Shipp, R., P.B., Kerang	492
Simmons, J. T., 3 Lindsay-avenue, Murrumbeena	8
Simpson, G. D., May-road, Glen Waverley	1,975
Skinner, Mrs. M. F., Princes-highway, Noble Park	76
Smith, E., Valley-road, Highton, Geelong	554
Smith, F., Lenham Poultry Farm, Terang	2,025
Smith, L. I., "The Ranch", Burwood-road, East Burwood	117
Spry, W. P., "Esswill", Culgoa	707
State Research Farm, Werribee	363
Stephenson, Mrs. K., Beard-road, Research	300
Stewart, J. A., Maldon-road, Castlemaine	777
Stewart, P. D., Bayswater-road, Croydon	22
Stiles Bros., "Fair View," Wallan	976
Sutcliffe, W., 71 Botanic-road, Warrnambool	104
Sutherland, J. M., Fulton-road, Box Hill	807
Sweeney, J. J., Tarara Stud Poultry Farm, 55 Rundle-street, Ararat	401
Taylor, E. D., Walker-street, Sebastopol	846
Throup, N. C., Neerim South	91

[*List continued on page 384.*

Tubercle-free Herds

Accredited Tubercle-free Herds.

The following herds have been declared free of tuberculosis under the *Accredited Tubercle-free Herd Scheme* conducted by the Department of Agriculture. Under this scheme a tubercle-free accredited herd of cattle is one in which the entire herd has passed two negative, successive, annual physical examinations and tuberculin tests, or upon disclosure of infection, three semi-annual, successive physical examinations and tuberculin tests applied by a State Veterinarian or by a qualified and registered veterinarian who is approved by the Chief Veterinary Inspector for that purpose.

Name.	Address.	Number in Herd.	Name.	Address.	Number in Herd.
Armstrong and Son	Wangaratta	105	Longerenong Agricultural College	Dooen	48
Ballarat Orphanage	Ballarat	105	Maloney P. J.		
Banyule Stud Pty. Ltd.	Wangaratta	54	McNabb and Son, G. A.	Tongala	66
Black, I. S., Estate	Mount Noorat	53	Nancarrow Bros.	Irrewillipe East	154
Cribbes, T.	Wangaratta	39	Noonan, G.	Kerang	52
Deering, J. T.	South Wangaratta	61	Noonan, Mrs. S. A.	Benalla	31
Dennis, Mrs. A. A.	Frankston	42	Northcote Children's Farm	Benalla	35
Dookie Agricultural College	Dookie	85	Onley, W. H.	Bacchus Marsh	164
Dunbar and Clark, Messrs.	"Hazeldean Dairy," Mount Dandenong	18		"Glenholme," Caldermeade	65
Geelong Grammar School	Corio	78	Parker, Mrs. L. M.	Tallarook	56
Gibson, Mrs. C. S.	"Sweeney's," Eltham	35	Payne, A. E. T.	"Yarra View," Lilydale	66
Gorman, A. W.	"Cathcart," Alexandra	57	Payne, T. E. N.	"Woodburn," Kilmore	44
Griffin, G. W.	Gladysdale	49	Poole, M. A. and D.	Caldermeade	150
Griffiths, J. G.	Benalla	121	Poole, M. A. and D.	Yannathan	79
Henry, J.A.	Warrnambool	41	Powell, T. S.	"Carellen," Mansfield	43
Howlett, Mrs. G. and Miss E. Samuel	Lang Lang	55	Richardson Bros., Messrs.	"Faldinghurst," Upper Beaconsfield	30
Jakobi, L. W.	"Granada," Yannathan	80	School of Horticulture	Burnley	6
Kane, F. E.	Warrnambool	28	State Experiment Farm	Rutherglen	37
Kilmany Park Farm Home for Boys	Sale	105	State Research Farm	Werribee	245
Lady Talbot Milk Supply Co.	Cranbourne	479	Stephens, Dr. F.	Vermont	32
Lawrence, P. H.	"Rainga," Tarrawarra	83	Vagg, T. E.	Officedale	45
			Wells, W. G.	Caldermeade	65

In addition to the above-mentioned, the herds set out hereunder, may be considered free of tuberculosis. All these herds have given negative reactions to two or more successive tests conducted by departmental veterinary officers, but inasmuch as replacement cows are only submitted to one test before being admitted to the herds, they cannot be considered as accredited under the accreditation scheme which requires, among other things, that no cow shall be admitted to the herds unless it has given two (2) negative reactions at an interval of 60 days, and must be kept in isolation during the period between the two tests.

Name.	Address.	Number in Herd at Last Test.	Name.	Address.	Number in Herd at Last Test.
Abbey, S. G.	Mernda	7	Bingley, R. P.	West Geelong	31
Alexander, Miss R.	Ballarat East	1	Blackmore, P. J.	Ballarat North	57
Anderson, A. R.	Craigieburn	123	Blake, Mrs. J.	Yarragon	11
Anderson, Mrs. N. J.	North Geelong	18	Blood, J.	Ballarat	8
Anderson, J. B.	Warrnambool	19	Blythe, R. E.	Connewarre	71
Andison, J. A.	Thomastown	46	Boland, Mrs. A.	Yarragon	31
Andrew, T. S.	Whittlesea	91	Boland, D.	Yarragon	40
Andrew, W.	Whittlesea	123	Booth, Mrs. A.	Warrandyte	7
Andrews, E. H.	Templestowe	19	Bourke, G. J.	Fairfield	82
Angliss, Mrs. R.	Ballarat	1	Bourke, J. W.	Somerton	37
Angus, W.	Moolap	6	Bourke, W. J.	Alfredton	26
Armstrong, Mrs. M. A.	Sebastopol	15	Bradbury, A. K.	Diamond Creek	50
Artley, A.	Sebastopol	11	Bradbury, G.	Kangaroo Flat	20
Atkinson, A.	Cambrian Hill	21	Brady and Cunningham	Doncaster	28
Atkinson, V.	Cambrian Hill	26	Bray, Mrs. O. C.	Glenroy	34
Baddon, D. W.	Yarragon	74	Brereton, E.	Kennington	25
Baglin, E.	Wallington	41	Brock, J. N.	Epping	16
Bailey, Mrs. A.	Doreen	11	Browell, L.	Golden Square	15
Baker, A.	Bannockburn	32	Brown, J.	Geelong West	7
Banfield, J. G.	Rosanna	66	Brown, Mrs. A.	Malden Gully	11
Barclay, A. H.	Whittlesea	93	Brown, R.	Kennington	4
Barker, Mrs. E. M.	Huntly	11	Brownhill, C. E. H.	Bundoora	34
Bates, D. S.	Whittlesea North	25	Bryden, A. C.	Bendigo	17
Bates, J.	Connewarre	21	Bumpstead, K.	Moolap	10
Batten, R. J.	Wollert	51	Bunting, J.	Epping	30
Beck, J. P.	Ceres	48	Burke, T. S.	Huntly	19
Bellis, Mrs. A.	Fyansford	15	Burns, D.	Moolap	8
Benson, R.	South Morang	40	Butler, W.	Wallan	69
Bickley Bros.	Wollert	64	Cahill, J. M.	Warrandyte	8

Name.	Address.	Number in Herd at Last Test.
Callaghan Bros.	Thomastown	66
Callaghan, L.	Epping	28
Cameron Bros.	Belmont	67
Cardwell, E. F.	Whittlesea	62
Carroll, M.	Fyansford	28
Cameron, G. A.	Connewarre	36
Cameron, J. J.	Connewarre	53
Carr, G.	Leopold	20
Carr, W. J.	Wollert	62
Carter, R. H.	Fyansford	23
Catt, G. P.	Yarragon	53
Cavagna, Miss	Sedgwick	7
Chadwick, Mrs. E. G.	Doreen	39
Challis, L. J.	Connewarre	57
Child, G. P.	Epping	54
Chiminello, A.	Epping	35
Christian Bros.	Doreen	42
Clark, H. M.	Nerrina	18
Clark, P. W.	Whittlesea	58
Clark, W. and T.	Kal Kallo	68
Clemence, S.	Warrenheip	23
Clunes, P.	Coburg	42
Cochrane, C.	Ballarat North	31
Collins, L.	Doreen	54
Collis, R.	Yarragon	1
Cooke, S. J.	Belmont	38
Cornfoot, D. H.	Whittlesea	43
Coulter, G.	Ballarat North	19
Coulthard, J. J.	Whittlesea	76
Cox, E. H.	Heidelberg	65
Crack, Mrs. E.	Bendigo	12
Craker, Mrs. E.	Warrandyte	5
Crawford, J.	Yarragon	44
Cross, G. A.	Mount Rowan	22
Crowe, P.	Gnarwarre	20
Crowle, A. J.	California Gully	16
Cuddihy, T. D.	Lovely Banks	26
Cumming, H. R.	South Morang	23
Cupris, A.	Bullock Creek	31
Curtis, W.	Wallington	35
Danaher, J. V.	Whittlesea	70
Danns, N. C.	Whittlesea	27
Dans, C.	Connewarre	80
David, Mrs. M.	Ballarat	2
Davies, A. H.	Drysdale	20
Deutscher, H. W.	Mernda	155
Devereux, Mrs. A.	Ballarat	3
Dickinson Bros.	Sebastopol	54
Dillon, L. W.	Epsom	18
Doggett, T.	Kangaroo Flat	17
Douglas, Mrs. J.	Alfredton	52
Downing, J.	Canadian	5
Dowton, Mrs. H.	Yarragon	47
Draper, L. S.	Wollert	35
Duke, J.	Ballarat East	1
Dunstan, W.	Pascoe Vale	32
Dwyer, F.P.	Greensborough	40
Earl, H.	Highton	3
Eckersley, W. H.	Alfredton	40
Edwards, S. R.	Sebastopol	14
Elford, S.	Magpie	34
English, N. J.	Donnybrook	47
Evans, D.	Mount Duneed	15
Evans, G. W.	Highton	15
Faulkner, G.	Yarragon	40
Fergusson, M. A.	Whittlesea	115
Ferres, Mrs. M. E.	Mount Clear	21
Fitzpatrick, W.	Mandurang	9
Fitzgerald, D.	Leopold	45
Fitzsimmons, B.	Lower Templestowe	35
Flanagan, A. D.	Epsom	10
Flynn, O.	Epsom	21
Fox, A.	Mernda	68
Franklin Bros.,	Sebastopol	29
Franklin, F. M.	Sebastopol	15
Friswell, H.	Bendigo	42
Galbraith and Walker	Greensborough	31
Gallagher, J.	Golden Square	20
Gallus, E. H.	Doncaster	14
Gamble Bros.	Greenvale	153
Gardiner, A. M., Estate of	Whittlesea	91
Gardiner, C. E.	Epping	29
Gargan, M. J.	Marshall	43
Gentner, H.	Eaglehawk	9
Gerrett, W. T.	Ballarat North	19
Gibbs, C.	Arthur's Creek	30
Gillies, N.	Diamond Creek	32
Godfrey, A. J.	Yarragon	49
Godfrey, W. and W.	Moolap	42
Goulden, J. B.	Wilson's Reef	54
Graff, Mrs. M. G.	Mernda	21
Graham, A. E.	Connewarre	35
Graham Bros.	Whittlesea	27
Gray, J. H.	Herne Hill	74
Green, J.	Eppalock	15
Green, R.	Leopold	27
Green, W.	Mernda	7
Greer, A.	Wollert	32
Grinter Bros.	Whittington	52
Griggs, Mrs. H.	Yarragon	47
Grinter, T.	Whittington	33
Guidice J. J.,	Kangaroo Flat	17
Gunn, A. J. B.	Ballarat	7
Gunn, W.	Kangaroo Flat	10
Hall, Mrs. J. E.	Whittlesea North	9
Hamilton Bros.	Huntly	17
Hamilton, C. H.	Yarragon	59
Hancorne, Miss M. R.	Yan Yean	34
Hanrahan, Miss E.	Sebastopol	4
Hanrahan, N.	Sebastopol	6
Hargreaves, W.	Emu Creek	10
Harmer, L. T.	Thomastown	44
Harrison, H. N.	Ballarat	17
Hawkes, Miss D.	Warrandyte	21
Hayes, J. J.	Smythe's Creek	6
Hedges, J. T.	Ballarat	9
Hehr, R.	Wollert	34
Henderson, J.	Donnybrook	58
Henshaw, E.	Lower Templestowe	9
Hewitt, C. J.	Wattle Glen	7
Hewitt, H.	Ballarat	13
Hickinbotham, Miss N.	Whittington	10
Higgs, R. N.	Yan Yean	76
Hilderbrand, P.	Sebastopol	21
Hill, H.	Campbellfield	48
Hill, J.	Somerton	86
Hill, W.	Ceres	25
Hill, W.	Somerton	39
Hinchcliff Bros.	Whittington	74
Hogan, Miss M.	Cambrian Hill	20
Hobbs, Mrs. F. J.	Doncaster East	5
Hocking, A. R.	Canadian	12
Hoctor, J. and Son	Greenvale	34
Hooper, A.	Moolap	15
Hose, W. J.	Grovedale	33
Houlahan, P.	Eppalock	40
Houlahan, T. J.	Eppalock	43
Huggins, R. E.	Ballarat	1
Hughes, Mrs. R. E.	Ballarat East	14
Hutchinson, J. B.	Drysdale	23
Ireland, C. E.	Yarragon	17
Jackson, Mrs. M. A.	Heidelberg	11
Jackson, Mrs. M.	South Warrnambool	6
Janefield Farm	Bundoora	43
Jeffrey, J. T.	Mernda	93
Jenkins, Mrs. A.	Mount Rowan	22
Jenkins, T. H.	Whittlesea	22
Jinks, J.	Curlewis	43
Johnstone, Miss J. A.	Mernda	12
Jones, I.	Lovely Banks	43
Jones, S. E.	Campbellfield	23
Jones, S. G.	Epsom	13
Jukes, C.	Epping	42
Jukes, W. H.	South Morang	38
Junor, G. M.	South Morang	56
Kane, F. E.	Warrnambool	28
Kell, W. E.	Greensborough	28
Kempton, C. J.	Highton	13
Kerr, J.	Mandurang	7
Kerwin, H. E.	Eaglehawk	21
Kilpatrick, E.	Mernda	89
Kinnersley, F. and Son	Wendouree	19
Kirkwood, S.	Eaglehawk	12
Knight Bros.	White Hills	42
Knight, G. A.	Sebastopol	29
Knowles, J. T.	Ballarat	3
Lacy, G. C. and Son	Cambrian Hill	32
Lacy, N. C.	Cambrian Hill	13
Lane, J.	Warrnambool	9
Langdon, C. W.	Barwon Heads	27
Lanning, W.	Moolap	17
Latta, Mrs. J.	Warrnambool	6
Lawry Bros.	Tandara	113
Lehmann, A. H.	Epping	36

Name.	Address.	Number in Herd at Last Test.
Lemin, F.	Waurn Ponds	33
Levett, E.	Warrnambool	12
Leviston, A. E.	Ballarat East	25
Levistor, G.	Ballarat East	9
Lewis Bros.,	Beveridge	64
Lincoln, Mrs. L. M.	Portarlington	46
Littlejohn, E.	Grovedale	22
Lloyd, W. M.	Mickleham	6
Lodington, Mrs. I. E. M.	Ballarat	8
Long, H. S.	Dingee	94
Longuehaye Bros.	Point Lonsdale	32
Love, J. E.	Strathfieldsaye	16
McAllister, K.	Whittington	36
Mackie, F. K.	Yarragon	63
McConachy, E. T.	Highton	33
McCormack, D.	Woodstock	59
McCormick, T.	Geelong West	24
McCulloch, A. A.	Warrnambool	28
McDonald, F.	Queenscliff	63
McDonald, Mrs. M.	Belmont	14
McDonald, N.	Highton	21
McDowell, R. H.	Greensborough	26
McEncroe Bros.	Bendigo	22
McGregor, W. B.	Mernda	44
McKay, L.	Kal Kallo	13
McKay, Miss E.	Donnybrook	51
McKay, Mrs. H. E.	Ballarat South	10
McKendry, J.	Doreen	69
McKenzie, D. I.	Marong	95
McLean, J. F.	Bundoora	24
McManus, D. J.	Napoleons	18
McManus, J. W.	Napoleons	14
McPhee, K.	Whittlesea	106
McPherson, A.	Yan Yean	82
McQuarie, J. C.	Mickleham	12
Mahood, J. E.	Purnim	113
Malcolm, W.	Drysdale	31
Maltzahn, Mrs. E. N.	Campbellfield	45
Mannes, W.	Strathfieldsaye	39
Martin, Miss A.	Napoleons	21
Martin, Miss G.	Ballarat	11
Martin, W. B.	Ballarat	20
Mashiter, T. R.	Greenvale	60
Mason, Arthur	Donnybrook	62
Mason, N.	Donnybrook	60
Maskell, E.	Fyansford	28
Mathieson, A.	Whittington	25
Matthey, A. J.	Bannockburn	111
Maxwell, J.	Whittlesea	32
Mays, Mrs. A. M.	Doncaster	6
Melling, T.	Kennington	16
Menhennett, F. W.	Sebastopol	21
Mercer, H.	Long Gully	18
Meredith, W. J.	Bundoora	68
Meyer, N. R.	Wallan	70
Millar, Mrs. G.	Smythe's Creek	51
Miller, A. J.	Whittlesea North	50
Miller Bros.	Greensborough	44
Miller, D.	Epping	42
Moller, C.	Wallington	33
Moller, H.	Leopold	38
Moore, R. G.	Moolap	23
Morris, C.	Sebastopol	28
Morris, E. J.	Huntly	19
Mortimore, S.	Epping	29
Mosig, H. C.	Epping	23
Munro, M. J.	Leopold	20
Murfet, Mrs. S.	Huntly	21
Nankervis, L.	Mandurang	15
Nash, A.	Corio	44
Nash, H. A.	Tullamarine	42
Nebel, Mrs. A. E.	Thomastown	39
Nelson, D.	Highton	58
Nestor Bros.	Wendouree	40
New, H. G.	Craigieburn	15
Nickols Bros.	Tandara	72
Noonan, J.	Sedgwick	50
Norton, J.	Yarragon	10
Notman, J.	Reservoir	68
O'Dell, J. E.	Ballarat East	21
O'Donnell, P.	Wendouree	38
O'Gorman, A.	Craigieburn	67
O'Halloran, J.	Sebastopol	28
O'Hern, T.	Epping	61
O'Keefe, J. P.	Warrnambool	21
Oliver, E. J.	Mickleham	32
Oliver, W.	Campbellfield	72
Olliver, Mrs. S. E.	Ballarat	14
O'Neill, E.	Yarragon	54
O'Toole Bros.	Yarragon	107
O'Toole, T. J.	Yarragon	10
Page, F. J.	Mount Rowan	38
Padovan, J.	Yarragon	28
Panozzo, Mrs. C.	Yarragon	92
Parker, R. H.	Craigieburn	91
Pascoe, Mrs. W. J.	Glenroy	2
Patullo, F. E.	Mickleham	31
Payne, A.	Tullamarine	23
Pearce, A. E.	Mandurang	55
Pearce, J.	Mandurang	24
Peel, A. L.	Drysdale	16
Pegg, W. E.	East Geelong	6
Pentland, E.	Maiden Gully	8
Pentland, F. C.	Marong	26
Pepper, D. S.	Wattle Glen	38
Phillips, E.	Mt. Pleasant	22
Pigdon, B. A.	Waurn Ponds	55
Pilcher, W.	Kangaroo Flat	13
Pitson, R. H.	Yarrambat	19
Pointer, F. A.	Upper Plenty	75
Pope, W. R. E.	Whittlesea	19
Portingale, J.	Campbellfield	42
Power, L. J.	Mernda	39
Putt, Mrs. D.	Bellarine	22
Quinlan Bros.	Epping	48
Ramage, J.	Mt. Pleasant	28
Rankin, J. W.	Yarragon	43
Rawlings, J. H.	Whittlesea North	31
Reddish, Geo.	Coburg	11
Renfrey Bros.	Drysdale	11
Renfrey, R. R.	Bellarine	22
Renkin, R.	Ballarat East	11
Reynolds, Misses	Yarragon	15
Richards Bros.	Leopold	56
Richards, T.	Ballarat	29
Richards, W. J.	Warrenheip	20
Richardson, C.	Curlewis	45
Richardson, D.	Leopold	23
Richen Bros.	Moolap	47
Ricketts, A.	Mount Duneed	29
Ridsdale, Mrs. M. M.	Yarragon	30
Riley, P.	Curlewis	50
Roche, Mrs. S. M.	South Morang	97
Rodgers, E.	Whittlesea North	14
Rosewarne, Miss P.	Yan Yean	49
Rowe, Mrs. M.	Eaglehawk	19
Ruff, A.	White Hills	12
Rumpf, D.	Fyansford	13
Salathiel, R. W.	Big Hill	14
Salau, E.	Strathfieldsaye	12
Scheuffele, C.	Epsom	24
Schreenan, E. and Son	Sebastopol	73
Scott, C. M.	Diamond Creek	49
Scott, G.	Connewarre	25
Scott, Mrs. J. M.	Whittington	118
Scott, R.	Marshall	97
Seeber, B.	Thomastown	28
Semmens, J. H.	Sedgwick	18
Shankland, I. D.	Greenvale	13
Shaw-Logan, T.	Glenroy	103
Sheahan, J.	Templestowe	30
Shearer, G.	Warrenheip	18
Shearer, J.	Warrenheip	11
Siebel, F.	Thomastown	29
Simpson, N.	Yarragon	35
Slorach, J.	Whittlesea	29
Smirfitt, J. E.	Epping	52
Smith, F. A.	Invermay	15
Smith, H. H.	Heidelberg	33
Smith, J. R.	Mernda	28
Smith, L. W. W.	Bundoora	81
Smith, M.	Heidelberg	43
Smith, R. A.	Epping	35
Smith, S. E.	Epping	33
Smith, S. H. A.	Yan Yean	17
Sobey Bros.	Napoleons	66
Somerville, A.	Strathfieldsaye	15
Somerville, J.	Strathfieldsaye	14
Somerville, M.	Strathfieldsaye	15
Somerville, P.	Strathfieldsaye	23
Somerville, W.	Strathfieldsaye	48
Southon, H. W.	South Morang	60
Spedding, Mrs. S. A.	Ballarat North	5

Name.	Address.	Number in Herd at Last Test.
Spruzen, G.	Wollert	41
Stacey, H. W.	Connewarre	60
Stacey, R.	Warrenheip	29
Stenning, R., Estate of	Wollert	34
Stephens, H.	Epping	10
Stevenson, R.	Wendouree	35
Stimson, T.	Woodstock	34
Story, A. E.	Emu Creek	36
Story, T.	Mandurang	24
Stringer, R.	Mickleham	4
Stuart, W. A.	Black Hill	3
Studleigh Estates	Greenvale	128
Sunderland, W.	Highton	28
Swanton, Mrs. C.	Invermay	41
Synot, C.	Fyansford	23
Thomas, Mrs. E.	Broadmeadows	10
Thomas, J.	Mandurang	39
Thomas, Mrs. V. E.	Yan Yean	17
Thompson, A. E.	Sebastopol	3
Thompson H.	Whittington	35
Thompson Bros.	Connewarre	21
Thompson, W. B.	Moolap	93
Thurlow, A. B.	Yarragon	34
Toman, Mrs. A.	Golden Square	15
Tomkins, I.	Belmont	14
Tomkins, Mrs. E.	Moolap West	19
Toshack, H. J.	Wendouree	38
Towt, C. W.	Glenvale	147
Trahair, R.	Malden Gully	49
Trigg, Mrs. A.	Breakwater	20
Troutbeck, H. R.	Mickleham	39
Tuddenham, F. T.	Cherry Tree	19
Tuddenham, M. J.	Cherry Tree	36
Twigg, G. E.	Tandara	61
Twomey, A.	Greenvale	39
Tyrell, H. S.	Marcus	58
Tyrrell, S. T.	Yarragon	81
Underwood, V. D.	Alphington	13
U'Ren, R. A.	Campbellfield	41
Vallence, C. A.	Epping	19
Vearing, E.	Epping	6
Vernon Estate	Cherry Tree	46
Vincent, Mrs. A.	Warrenheip	19
Wallace, R.	Breakwater	24
Wall and Faulkner	Marshall	77
Waller, R.	Ballarat	26
Walsh, B.	North Geelong	39
Walsh, C. J.	Yan Yean	7
Warner, K.	Batesford	33
Warren, E. and T.	Moolap West	36
Warren, S.	Moolap West	26
Watkins, F.	Campbellfield	71
Wheeler, W. A.	South Morang	34
Whelpton, B.	Whittlesea North	88
White, A. J.	Yarragon	40
White, L. and S.	Alfredton	53
White, T. L. R.	Alfredton	53
White, W.	Greensborough	17
White, W. H.	Ballarat West	17
White, W. H.	Smythe's Creek	57
White, W. J.	Alfredton	18
Whitelock, E. A. and E. J.	Epsom	23
Whitfield, A. E.	Bendigo	6
Whittingham, E. W.	Greensborough	33
Wicks, C.	Golden Square	18
Wiffin, W.	Bellarine	54
Wightman, T. A.	Ballarat East	11
Williams, E. A.	Thomastown	32
Williams and Berryman	Bendigo	15
Williams, Mrs. N.	Tullamarine	40
Williamson, E. H.	Batesford	39
Williamson, H.	Greenvale	19
Williamson, J.	Doncaster (High-st.)	4
Willis Bros.	Craigieburn	54
Wills, R. G.	North Geelong	23
Wilson, J. E.	Diamond Creek	9
Wilson, J. H.	Eltham	3
Wilson, Mrs. M.	South Morang	12
Wolter, Miss R.	Barwon Heads	26
Wooster G. S.	Watsonia	23
Wrest, W.	Epping	93
Wuchatsch, J. D.	Epping	17
Yann, R.	Wollert	52
Young, A.	Queenscliff	18
Young, J. A.	Sedgwick	39
Young, R. L.	Wollert	26
Young, W. S.	Sedgwick	54
Ziebell, H.	Thomastown	40

In addition to the above herds, there are 1,494 head of cattle on 270 properties supplying milk to Benalla, Wangaratta, Rutherglen, and Yea, that have passed two successive negative tests.

There are also 428 herds in which 11,238 head of cattle have passed one test, and may be considered, therefore, to be in process of becoming tubercle-free herds.

CERTIFIED PULLORUM TESTED FLOCKS—*continued from page 380.*

Owner.	Number of Birds.
Travaglia. V., St. Arnaud Poultry Farm, St. Arnaud	876
Trinca, M., Valley-street, East Oakleigh	1,123
Triplett, C. A., Muskerry, via Goornong	184
Waldmann, F., Greythorn-road, North Balwyn, E.9	1,111
Walker, Mrs. E. H., Lancefield	173
Walters, V., High-street, Lower Templestowe	79
Webb, A. E. H., Wimbledon Poultry Farm, Frankston-road, Cranbourne	2,848
West-Onley, K. E., "Len-lea", St. Arnaud	82
White, G. J., Watson's-road, Glen Waverley	818
Williams, V., Wangaratta Hatchery, Wangaratta	605
Wimhurst, J. C., Tongala	405
Winter, G., "Denchurst," Murgheboluc	386
Wohlers, S., Jung	377
Wright, A., Congupna Township, via Tallygaroopna	95
Youl, R. S., Wycherley, Wedderburn	1,127

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Issued by direction of the Hon. N. A. Martin, M.L.A., Minister of Agriculture.

SUBSCRIPTION RATES

The Journal is issued monthly. The subscription, which is payable in advance and includes postage, is 3s. per annum for the Commonwealth and New Zealand, and 5s. for the United Kingdom and Foreign Countries. Single copy, Threepence. Sunscriptions should be forwarded to the Director of Agriculture, Melbourne, C.2.

POSTAGE RATES

The postage required for this issue is:—To Australia and New Zealand, 1½d.; to United Kingdom, 2½d.; to United Kingdom via All-sea Route, 1½d.; to other British Possessions, 2½d.; to U.S.A. and Foreign Countries, 3½d.

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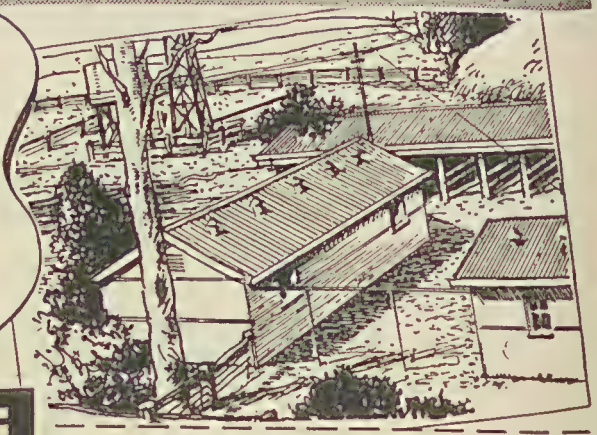

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STANDARD HERD TEST

REPORT FOR YEAR 1943-44

By W. J. YUILL, Supervisor of Herd Testing

Mr. P. J. Maloney's Reserve Champion herd of "Belgonia" Jerseys which averaged 522·1 lb. butterfat.

THE average yield of 331 lb. butterfat for the 2,173 cows in the Standard Herd Test during the past year is the lowest since 1934. This decline in yield was largely due to the long, dry summer and autumn, the limited supply of fertilizers, difficulties in securing adequate supplies of concentrates, and to war-time conditions generally. In the circumstances comparisons with performances of other years will serve no useful purpose. Under the conditions prevailing throughout most of the season the average yield must be regarded as satisfactory.

Some high prices were paid during the season for pure-bred dairy cattle. One Victorian breeder purchased a Jersey cow in New Zealand for £600, while record prices were paid for cattle in this State. Over £300 was paid for a cow on more than one occasion.

The Champion and Reserve Champion Herds occupy the same positions as in 1936-37. In that year, however, the "Mornmoot" Stud led by 120 lb. of butterfat per cow. The high yield of Mr. R. M. Chirnside's herd on that occasion (650 lb. butterfat with allowances), was claimed to be an Australasian record for a herd of its size. The 598 lb. actual average yield of the seventeen cows in that year is the highest herd-average ever recorded in this State.

It is interesting to note that, in 1932, twelve Friesians owned by Doan Straub, of Michigan, averaged 629·8 lb. butterfat. Since these figures would be for a ten-month period, the "Mornmoot" record, taken on a period of 273 days, could well be regarded as one of much wider than Australasian significance.

Champion Herd

When all junior-cow and herd-size allowances were added, and the figures carefully rechecked, a difference of only one-tenth of a pound of butterfat could be found between the two leading herds this year. The "Mornmoot" herd average, with all allowances, was 522·2 lb. butterfat.

"Pine Ridge Countess 3rd.", Mr. H. Jackson's mature Jersey, produced 619 lb. butterfat.

In 1934-35, Mr. Chirnside won the championship by three-tenths of a pound of butterfat from "The Wattles" Stud. These narrow margins, however, do not detract from the greatness of the "Mornmoot" herd. This is best seen in the following table which sets out details of the eight championships which have been won by the herd since 1934.

TABLE OF THE "MORNMOOT" HERD'S CHAMPIONSHIPS.

Year.	Cows.	Average Butterfat Per Cow.	Average Butterfat with Allowances for Herd and Junior Cows.
1934–35 ..	13	523·74	599·47
1935–36 ..	15	522·49	613·99
1936–37 ..	17	598·19	649·78
1937–38 ..	24	496·38	570·04
1938–39 ..	27	454·82	538·60
1939–40 ..	20	480·90	552·70
1940–41 ..	21	495·10	561·80
1943–44 ..	27	431·80	522·20

The "Mornmoot" herd goes back almost entirely to the well-known "Werribee" Stud of the late George Chirnside. The famous "Princess" and "Fancy Madeiras" have a common ancestress in old "Madeira 5th" (imp). The "Satisfaction" and "Starbright" families are also widely known. Further reference will be made to their descendants in the report on the age classes. It is doubtful if any breeder anywhere has a greater measure of success in official herd tests than the owner of the "Mornmoot" Stud.

Reserve Champion Herd

Mr. P. J. Maloney, the owner of the Reserve Champion Herd, first brought his "Belgonia" Stud into prominence when he won the Standard Herd Championship in the years 1927 and 1928. At that time, the herd was composed mainly of cows bred off stock from the "Springhurst," "Tarnpirr," and "Bonshaw" herds. Two great cows in those early years were "Wattle" and "Czarina of Springhurst." Each had many good yields, including one of more than 580 lb. butterfat.

After his dispersal sale in 1931, Mr. Maloney went abroad, and imported from Jersey Island two great cows in "Suspense" and "Gem's Noella." The former averaged 576 lb. butterfat for four years, while the latter had a five-year average of 541 lb. Each cow also exceeded the 600 lb. butterfat level. "Belgonia Marie 4th," "Peggy 6th," and "Eileen 2nd of Clarendon Eyre," were also among the foundation cows of the herd which won the Championship in the year 1933-34. The herd that came so near to winning the Championship on this occasion consists chiefly of daughters of the imported bulls "Aim High" and "Baron Design."

PERFORMANCES OF THE "BELGONIA" HERD SINCE 1925-26.

Year.	Placing.	Herd Size.	Average Butterfat.	Average Butterfat with Herd and Junior Cow Allowances.
			lb.	lb.
1925–26	Reserve Herd	11	440·98	482·75
1926–27	,, ,,	11	503·44	522·57
1927–28	Champion Herd	15	479·72	555·55
1928–29	,, ,,	16	509·19	570·60
1933–34	,, ,,	10	498·29	560·20
1936–37	Reserve Herd	18	470·86	529·02
1943–44	,, ,,	29	448·20	522·10

The splendid herd average of 522·1 lb. butterfat is materially assisted by the unusually high, even-yielding junior cows. These latter records

Mr. G. S. Daley's Jersey "Karrara Fancy Madeira" occupied fifth position on the list of cows which produced more than 600 lb. butterfat. (Yield 650 lb.)

indicate that the "Belgonia" herd will have to be reckoned with in the immediate future. Some idea of the quality of the herd may be gained from the preceding table.

Some High-yielding Herds

After holding a commanding position for several years among all herds, Captain A. E. T. Payne's "Yarraview" Guernsey herd carried off the Championship in 1943. On this occasion the herd is placed in third position. The 23 cows comprising the herd have the good average of 447·5 lb. butterfat. This figure was helped materially by the exceptionally high yield of the champion cow "Yarraview Le Mode," and the 639 lb. yield of "Yarraview Alys," one of the leading mature cows.

The fourth and fifth herds have almost identical figures of herd size and butterfat. There is, however, no comparison in the conditions under which the herds are tested. Messrs. S. H. Masters and Son have a remarkably even herd, which is tested on the Murraydale Flats, near Swan Hill. Practically no concentrates are used, but the herd is liberally fed on lucerne chaff at the bails, and is rotationally grazed on irrigated lucerne and pastures. At Linton, Mr. R. H. Mitchell has developed a remarkable herd of Jerseys. His sixteen cows averaged 439·6 lb. butterfat (490·1 with allowances). In spite of the poor pastures and, at times, poor water supply, this herd has repeatedly shown excellent yields. In last year's report the "Clifford Farm" Jerseys led the small-herd section with 502·7 lb. butterfat average yield when allowances for junior cows were added. Many fine yields have been made by cows from this stud, including "Clifford Farm Pussy Willow," this year's Reserve Champion Cow.

Mr. H. Jackson's twelve cows at Lockington had the highest figures of the year. Their average of 525·1 lb. heads the small-herd section. As the number of cows is less than fifteen, Mr. Jackson is debarred from the Championship, but the excellent performance of his junior cows suggest that more will be heard of him later.

In the larger herd of the "Devon Park" Stud Farm, 31 cows averaged 450 lb., while Dr. A. R. Haywood's "Windrest" herd, like many others, suffered from the effect of burnt-out pastures and a poor season. In the circumstances, 448·7 lb. average is a good performance.

Only 13 lb. butterfat separates the 56 Werribee Red Polls of the State Research Farm, Werribee (420·3 lb.), the 66 "Maxon" Jerseys of G. A. McNabb and Son (410 lb.), and the 51 "Willow Park" Dairy Shorthorns of W. K. Atkinson, the three largest herds in the Test.

A group of four "Mornmoot Princess Madeiras," owned by Mr. R. M. Chirnside.

The mature Guernsey cow "Yarraview Le Mode," owned by Captain A. E. T. Payne, is the Champion Herd Test cow of the year with a yield of 976 lb. butterfat.

Two years ago, "Le Mode" was Reserve Champion, her yield then being 816 lb. butterfat. That record has been eclipsed on this occasion, her yield of 15,000 lb. milk and 975·8 lb. butterfat constituting a State record for any breed. "Le Mode's" record is creditable also because of the fact that she has re-calved and has achieved another high yield within a year of completing her championship effort. During the 273-day lactation period ended 11th August, 1944, "Le Mode" produced 14,813 lb. milk, with a 6·5 per cent. test, and 963·4 lb. butterfat. "Le Mode" yielded 42½ lb. milk on the last day of the test period.

Eight herds only exceeded the 400-lb. butterfat level; four of these herds, however, were raised above the 500-lb. level, when herd size and junior-cow allowances had been added.

A careful perusal of the individual cow yields in the various herds will reveal many animals with excellent lifetime performances, for not all such are to be found in the leading herds. To assist breeders and farmers, these cows have been placed in the Advanced Register of Merit for easier comparison and in order to give due prominence to the most worthy animals of each breeder. A list of the cows on the Register will appear in the Standard Herd Test Report, which will be published by the Department early in October.

The Champion Cow

"Yarraview Le Mode," the Champion Herd Test cow of the year, is one of the most remarkable cows ever to take part in the Standard Herd Test. Beginning her test career at 26 months of age, this cow carried off the State Championship for the Junior two-year-old class, with a yield of 563 lb. butter-fat. She now holds the Australian records for the Junior two, Junior four, and Mature Cow classes for the Guernsey Breed.

Had "Le Mode's" Junior two-year-old milk yield of 10,497 lb. contained the normal butterfat percentage that she has established during the remainder of her test career, her initial yield might well have been over 650 lb. During the first four months of that test, her butterfat percentage was 4·2 only. This was caused by an extensive swelling, which resulted from the activity of a fifth section of the udder. After treatment and the subsidence of the swelling, "Le Mode" at once gave the remarkably high test which has been a consistent feature of her milk yield. That she is a real champion is shown by the high milk weight on the last

"Mornmoot Princess Madeira 9th," Mature Jersey, produced 652 lb. butterfat.

test day of each lactation, which usually exceeds 3½ gallons. Her recorded production, therefore, does not truly reflect her year's work, or lifetime yield.

Last year "Le Mode's" great yield was assisted to some extent by thrice-a-day milking during three sub-periods. Her present yield, however, is being made on twice-a-day milking. Unfortunately, this cow's full lifetime yield will never be known, because her yield as a three-year-old is unknown. This was due to her withdrawal from test because of an accident. The details of "Le Mode's" test years are as follow:—

TEST RECORDS OF "YARRAVIEW LE MODE."

Age.	Milk.	Test.	Butterfat.	Last Day's Milk.
	lb.	%	lb.	lb.
Junr. 2 ..	10,497	5·36	562·55	33
4 ..	11,246	6·56	737·84	35
5 ..	11,840	6·89	815·50	35
6 ..	15,000	6·50	975·80	37½
7 ..	14,813	6·50	963·4	42½

The sire and dam of "Le Mode" (who was imported in dam) are a grandson and granddaughter of "Sunrise of Maple Lodge," a son of "Camilla 2nd."

"Camilla's Majestic 3rd of Maple Lodge," the sire of "Le Mode," and "Majestic 2nd of Maple Lodge," the sire of her dam, are both sons of old "Camilla of Maple Lodge," as is also "Camilla's Majestic of Maple Lodge." The latter bull was imported by Captain A. E. T. Payne, and sired some great producers at "Yarraview," including "Julie," 706 lb.; "Ruby," 637 lb.; and Teeny," 688 lb. butterfat. "Ella" twice over 620 lb., "Siren" and "Essie," each over 500 lb. butterfat on five occasions, are also his daughters.

The breeding of "Le Mode" is rich in the inheritance of the "Camillas," the "Sequels," and the "Slogans." This cow ranks with the truly great cows of all breeds. Among her virtues are an unusual dairy temperament, a high butterfat percentage, and persistent milk flow over many years. Despite the fact that she has worked at high pressure throughout her life, "Le Mode" is wearing well, and shows little effect from her great performances.

The Reserve Champion Cow

The splendid yield of 838·4 lb. butterfat made by "Clifford Farm Pussy Willow" would, in most years, have won the championship. As it is, she now leads the mature cow section of the Jersey breed in Victoria. Her yield is 12 lb. higher than the record made by "Jerseyinn Edith 2nd" in 1937-38.

"Clifford Farm Danny Boy," the sire of "Pussy Willow," is a proven son of a proven sire. His eight first-calf daughters have the excellent average yield of 386 lb. butterfat; while his sire, "Wompini V.C.," has nine daughters, which were tested at "Clifford Farm" Stud, which has an average high yield of 514 lb. butterfat.

The high yields of "Clifford Farm" test cows have been much in evidence during past years. "Gladsome," the dam of "Pussy Willow," has exceeded the 700-lb. level, and has an unfinished lifetime performance of more than 2 tons of butterfat. Like her full sister, "Clifford Farm Lady Sarah," "Gladsome" occupies a high ranking position on the Standard Herd Test Advanced Register of Merit.

"Clifford Farm Lillas," 629 lb. butterfat, and several other cows which have yielded over 500 lb. butterfat, were developed at "Clifford Farm," where Mr. Mitchell's expert management, added to the splendid dairy

Mr. W. B. Eltringham's Mature Jersey "Clifford Farm Pussy Willow" is the Reserve Champion cow for the year, with a yield of 838 lb. butterfat.

capacity of the stock, has largely overcome the lack of lush pastures, which are so generally associated with irrigation farms, river-flats, and high rainfall areas.

"Pussy Willow" was tested by Mr. W. B. Eltringham at Lilydale, but is now owned by Mr. E. H. Lancaster, who has purchased Mr. Eltringham's farm and stock.

The Leading Six Cows in Each of the Age Classes

The breeds of cattle which originated in the Channel Islands occupy a prominent place in all the sections of this report. In addition to the Champion and Reserve Champion herds and cows, every one of the positions in the seven age classes, as well as each of the over 600-lb. butterfat cows, is either a Jersey or a Guernsey.

The outstanding performances of "Yarraview Le Mode" and "Clifford Farm Pussy Willow" in this year's test make some high records of the past appear quite ordinary performances.

Fourth place is filled by "Mornmoot Princess Madeira 9th," with a yield of 652 lb. butterfat. This effort was preceded by yields of 551, 661, and 632 lb. This cow's consistent yields have earned a high ranking on the Register of Merit. Her maternal half-sister, "Mornmoot Princess Madeira 20th," is third in the Junior four-year-old list, with a 552 : 9 lb. butterfat yield. Her twin sister, "Madeira 21st," has a 588 lb. Junior three-year-old record. The dam of these three junior cows is the 1938 Champion test cow, "Mornmoot Princess Madeira 3rd," whose dam in turn is the famous producer "Mornmoot Princess Madeira," twice Champion, and once Reserve Champion test cow. Each has exceeded the 700-lb. butterfat level on three occasions.

"Mornmoot Princess Madeira 17th," the leader of the Senior three-year-old class, is also a daughter of the old champion. She looks like adding lustre to the "Mornmoot" Stud's reputation, for she has produced 1,664 lb. butterfat before reaching the four-year-old standard. "Mornmoot Princess Madeira" (ten years' average 595 lb.), and "Mornmoot Princess Madeira 3rd" (six years' average 653 lb. butterfat), occupy the two highest positions in the Jersey section of the Advanced Register of Merit.

Another worthy daughter of a great herd test cow occurs in "Mornmoot Fancy Starbright 6th," whose 541·5 lb. yield, makes her the second Senior three-year-old. Beginning her test career as a 507-lb. butterfat Junior two-year-old, she now joins the very select group of juniors which has produced three records, each over 500 lb. butterfat, before reaching the four-year-old class. Her dam "Fancy Starbright" has an

Three of Mr. P. J. Maloney's "Belgonia" Jerseys, each the leading Cow in her section.

Top—"Junette 7th," Junior four-year-old, 596 lb. butterfat. Left—"Suspense 12th," Senior two-year-old, 552 lb. butterfat. Right—"Junette 15th," Junior two-year-old, 495 lb. butterfat.

[*Continued on page* 421.

IRRIGATED PASTURES

By L. C. BARTELS, B.Agr.Sc., Senior Agrostologist

STATISTICS of crops grown under irrigation in Victoria reveal that the State has some 300,000 acres of sown pastures under irrigation. This is a development of the past twenty years. The extension has been particularly rapid in the last ten years and provides evidence of the appreciation in which irrigated pastures of mixed grasses and clovers are held by farmers in the irrigation districts.

The area does not include irrigated natural pasture which is still a feature of many districts and generally represents the poorest form of irrigation farming, whereas the improved pastures to be seen on many blocks under intensive irrigation are the summit of irrigated agriculture.

The term "irrigated pastures" applies to many kinds and combinations of grasses and clovers, but mainly the standard European species. Annual grasses and clovers, such as Wimmera rye grass and subterranean clover, are grown to provide winter pasture or to meet circumstances where continuous summer irrigation is not practicable, but the perennial pastures grown are usually mixtures of perennial rye grass, cocksfoot, white clover, and strawberry clover, with paspalum and many other species usually as volunteer components.

Lucerne was the basic perennial crop in the development of the irrigation areas. It is a very productive plant of outstanding worth, and advocacy of mixed pastures is not intended to detract from its value as a crop for irrigation. An area of lucerne makes a desirable complement to Wimmera rye grass and subterranean clover pastures. For best production from lucerne regular watering in summer is necessary, but it will not die if irrigation cannot be carried out as frequently as desirable. On the other hand, mixed pastures in the irrigation districts require frequent and regular watering.

The Beginning

Mixed pastures were first tried at the Wyuna State Farm in the Goulburn Valley and also at the State Research Farm, Werribee, when it was established over 30 years ago. These pastures were relegated to areas unsuitable for lucerne, and the first pastures grown were mixtures of all available pasture species. The lucerne at Werribee made spectacular growth, and at first its success obscured the worth of the mixed grasses and clovers which were in less favourable situations and received what must be regarded now as poor treatment, but as time passed, the sustained high stock-carrying capacity of the pastures became evident, and their suitability for heavy soils and wet situations was demonstrated. Instead of degenerating under hard grazing the pastures improved with age, and the 30-year-old pastures at Werribee are still very good. With the passing of time some of the elements in the original mixtures have died out, others have survived in particular sections of the paddocks. The growth habits of the plants and selective grazing by stock have guided officers in the choice of species. The variety

Italian rye grass persists only under very favourable conditions, and may be regarded as a temporary element in pastures.

of feed presented to stock grazing these mixed pastures, and the continuity of feed resulting from the succession of growths of different species, all contributed to the well-being and contentment of stock.

The lucerne became "patchy," and when the time came for its replacement some ten years after sowing it was decided to sow mixed pastures in its place, and that policy has been continued with satisfactory results.

Cocksfoot asserts itself when meadows containing this species are reserved for hay making.

The Value of Mixed Pastures

Arising from these experiences the Department of Agriculture proclaimed the value of mixed pastures under irrigation. Dairy farmers on the Werribee settlement adopted them, and they were introduced in all irrigated closer settlement areas of the State. Farmers who tried pastures and gave them necessary attention were encouraged by results to extend the area sown, in place of lucerne and in sections of their farms where lucerne did not make satisfactory growth.

The permanency of the pastures, their high carrying capacity, the variety of feed they gave, their wide adaptation to varied soil conditions, the fact that grazing is the best way of using them, and also that they will withstand abuse in over-grazing and watering, all explain why irrigated pastures have displaced lucerne.

The oldest irrigated pastures under review are the best. The pastures and the grazing animals are soil fertility builders, and there is a promised stability in our irrigation districts now which contrasts with the conditions

in some of the older districts where pastures are not general. There is sufficient evidence from every district to warrant advocacy, because they are a feature of the best dairy farms of the Swan Hill flats, at Cohuna, and of districts in the Goulburn Valley, as they are at Werribee and Maffra in the south of the State.

An outstanding pasture of perennial rye grass and irrigation white clover at Dingee.

Irrigated pastures have been effective agents in the reclamation of "salted" land. Much land in the Cohuna district, for example, was sterile through the rise of ground water and concentration of "salt" on the soil surface as the water evaporated, but the district has examples of the most luxuriant mixed pastures which provide a cover for the land, retard evaporation of soil water, and cause the "salt" on the surface to be redistributed through the subsoil. The successful growth of mixed pastures represents a reformation in irrigation cultural practices which in the early days were crude.

Experiments

Investigations into the factors governing growth of irrigated pastures were made at the State Research Farm, and as the results became available they were tried out in local tests in several districts and communicated to farmers. These tests related to pasture establishment methods, choice of species, water and manure requirements, and the best methods of grazing management and utilization of the herbage.

The growth or productivity of the grazing animal is the best measure of quality of pastures, and the animal contributes to the progress of pastures while deriving its sustenance from them. In measuring results from test plots the ideal means would be to compare different systems by the effect on the animal,

Preparing land for irrigation-grading and check-banking on the border system.

An excellent irrigated pasture at Tongala.

but in practice compromise must be made, and that applies to the method at Werribee, where mowing to imitate grazing was adopted and the weight of clippings taken as the measure. With all its defects this method was most useful, and the results when correlated with botanical surveys and also grazing tests have given much information and led to new concepts.

One of the first results was a realization of the high productivity of irrigated pastures. From a plot receiving 4 cwt. of superphosphate aggregate yields from some twelve clippings in the year amounted to 31 tons per acre. Chemical analyses of the clippings showed that they have a high crude protein content (up to 25 per cent. on a dry basis), and these facts explain why young sheep in a test at Werribee have made aggregate gains in live weight of more than 1,000 lb. per acre in a year, and that, too, on pasture which has been intensively grazed for fifteen years.

A Wimmera rye grass-subterranean clover pasture at Pyramid.

Layout for Irrigation, and Watering Methods

As a first consideration in regard to irrigated pastures, the Department emphasizes the importance of proper grading and layout of the land to ensure efficient use and control of water.

Pastures tolerate wetness, but that should not be used as an excuse for careless irrigation. The farmer should aim at having facilities for control of irrigation water, uniform application to the land, and the reduction of waste water.

The "border method" of irrigation is recommended for general adoption. This means the division of the land to be irrigated into "bays" by small banks running down the slope and the levelling of the land between the banks from side to side, with a plane surface down the slope. The banks are made a foot high when constructed, but they settle to some 6 or 7 inches with a spread at the base of 5 feet or more. The banks are constructed across the contour and their direction may be changed accordingly, but usually they are straight and at right angles to the lateral channels.

"Dillon Bush," growing on "salty" land at Tragowel.

The dimensions of the bays may be varied. Ordinarily, "bays" longer than 10 chains are not desirable, as long "bays" are not conducive to efficient management of the irrigation water. On some porous soils 2 or 3 chains is long enough.

The width of the bays may be varied, too. In general practice on irrigated pasture land it varies from $\frac{1}{2}$ to 1 chain. If the land has "sidefall" the banks are brought closer together, and bays 22 feet wide are a feature of some districts. Close banks make for efficient watering but present obstruction to implements. Irregular-shaped bays are not favoured. At the State Research Farm, Werribee, bays 10 chains long and $\frac{3}{4}$ chain wide have been very satisfactory.

Choice of Pasture Species

In the choice of grasses and clovers for sowing, the farmer must consider irrigation facilities. The Werribee experiments indicated that for perennial pastures 2 feet of water per annum, in addition to rainfall, is necessary. It is the amount that was determined as the requirement of lucerne, too, but pastures must be watered regularly, and this is emphasized because it is not what is sown but the way the pasture is treated that determines the results.

Land immediately adjoining the above block effectively reclaimed and growing lucerne and mixed pastures.

In a series of plots at the Research Farm, all sown with the same mixture, varied rates and frequencies of watering were applied and very different herbage resulted. In practice in the northern areas, regular watering resolves itself into irrigation at fortnightly intervals in the warm parts of summer.

For the irrigation districts where partial irrigation only is practicable, perennial pastures are not recommended, but a mixture of Wimmera rye grass and subterranean clover is suitable. They may be established on well-prepared land by sowing Wimmera rye grass, 5 lb. per acre, and mid-seasonal

subterranean clover, 2 lb. per acre. These two elements may be established by sowing with oats (not more than half a bushel per acre).

The late strain of subterranean clover, "Tallarook," does well under irrigation. On the other hand, it is wrong to sow early maturing strains, such as "Dwalganup," where irrigation is practicable.

The maintenance of subterranean clover in the northern areas is likely to require two irrigations in autumn and two in spring and the use of a foot of water. No summer watering is required but ordinarily some annual summer fodder such as sorghum or millet is needed for provision of summer feed, and an area of lucerne makes a desirable complement to the subterranean clover.

In the closer settlement districts where intensive irrigation is practicable, a mixture such as the following has been the foundation of excellent pastures—

Certified perennial rye grass	10 lb. per acre
Cocksfoot (Victorian or certified N.Z.)	5 lb. per acre
Italian rye grass	5 lb. per acre
Perennial red clover (N.Z.)	2 lb. per acre
Certified Irrigation White clover	1 lb. per acre
Subterranean clover ..	1 lb. per acre
Alsike clover	1 lb. per acre
Strawberry clover	¼ lb. per acre

The really permanent elements in this mixture are the perennial rye grass, cocksfoot, white, and strawberry clover, and together they make up excellent pasture.

The other species are accessory and give quick growth while the permanent elements are developing.

Some farmers object to the inclusion of subterranean clover "because it takes control" and very often it may dominate the herbage in young pasture, but that usually indicates irregular or insufficient summer watering, and if the farmer "takes control" and by regular watering promotes the growth of the white clover, the subterranean clover will be kept in bounds

In many cases, on cultivated land, the land is not receptive to fertility loving species like white clover, and under such conditions the subterranean clover does good pioneering work, because it helps to build soil fertility and lays a foundation for better species.

Paspalum dilatatum is not included in the mixture, but in most districts it is a conspicuous element in the irrigated pastures in summer. It is likely to introduce itself and if the pastures are allowed to degenerate, it will become dominant. It grows in wet places but shows resistance to dryness. Phalaris tuberosa is another grass which combines tolerance for wet conditions with drought resistance. It is a winter grower. These two grasses will fit into conditions where occasional irrigation is practicable but water supplies are not dependable. The value of both is improved if they are kept short and the real value of the "paspalum pastures" usually lies in the white or strawberry clover with which it is associated.

The amounts of seed prescribed are arbitrary. If the land is thoroughly prepared and care is taken to purchase only high quality seed, a lower rate of seeding may be adopted with expectation of satisfactory results. Quality in seed refers not only to

All available species and strains of grasses and clovers likely to be useful under irrigation are subjected to critical study at the State Research Farm, Werribee.

germinability and freedom from foreign matter but to inherent physiological quality which distinguishes strains of seeds. That is implied in the recommendation to sow "certified" perennial rye grass, "certified" irrigation white clover, Victorian or New Zealand cocksfoot. The farmer is urged not to compromise regarding this matter, because these are strains which have proved adaptable to local conditions. The restrictions on imports, due to the war, have reduced the amount of inferior seed in trade, and happily, farmers are using greater discernment in buying seeds separately and in sealed bags.

Perennial red clover (cow grass) makes a useful contribution to the production of mixed pastures under irrigation during the first three or four years.

Sowing the Seed

A good seed bed, clean and firm, is very desirable. Sowing may be done in autumn or early spring. It is best, however, that seeds shall germinate under rainfall, and that is most assured after autumn sowing when the young seedlings will have a chance to secure themselves before the summer. Pea-mites and lucerne flea have serious effects on seedling clovers particularly in late autumn and winter. This danger is lessened if the land has been ploughed and left in clean fallow. Spring sowing on clean ground also reduces the risk, because growth is more active from August onwards. Spring sowing involves nursing the young pasture by careful and regular irrigation. In sowing, the seed may be broadcast, but it is done best by drilling; the seed may be mixed with the manure and sown through the manure run of the drill. The tubes of the drill are taken out of the hoes and allowed to dangle and distribute the mixture along the rills made by the hoes. Seed is covered effectively by a chain spread and trailing behind the drill.

Superphosphate is now in limited supply; in normal times 2 cwt. of 22 per cent. "super" per acre was not too much to apply at sowing time.

Young pastures in the early stages should be carefully tended. Lenient grazing is favourable unless the quick-growing elements, such as Italian rye grass, threaten to smother the slower-growing elements, such as white clover.

When established the pastures will reflect the treatment they receive. Regular irrigation and liberal manuring are basic requirements. A total of 2 feet of water per annum in frequent applications is commonly used, and prior to the war many successful farmers were applying up to 5 cwt. of 22 per cent. super per acre every year.

Watering calls for some judgment. In the early stages the land may dry out too rapidly for best results, but as the sward builds up, the irrigation becomes easier and more effective.

Topdressing is best done in autumn to promote growth in winter when feed is most needed, but it will be effective at any time of the year. In all irrigation districts "superphosphate" alone has proved the best fertilizer, and repeated heavy dressings have never proved other than beneficial.

Grazing management influences the pastures. Hard grazing at intervals is best, and experiments suggest that a resting period of 3 weeks between grazing is conducive to good results by preserving a balance of species and reducing danger of bloat. During the period of active growth in spring the grazing rotation should be narrowed and areas reserved for growing a crop for hay to be conserved for supplementary feeding in the lean periods of the year.

[*Continued on page 402.*

CONTROL OF MASTITIS

Prevention is Better than Cure

Contributed by the Veterinary Staff

Mastitis is one of the most serious causes of lowered milk yield in dairy cows, and although losses due to this insidious disease can only be guessed at, there is no doubt that effective control of the trouble would result in a marked improvement in quality, and a very significant increase in quantity of milk from the dairy herds of this State. It has been estimated that its elimination would mean an increase of between 20 and 25 per cent. in our milk production. Therefore, every effort the farmer can make to reduce the incidence of the disease in his herd will be rewarded by a corresponding increase in production. The old maxim, " Prevention is better than cure ", applies equally to mastitis as to any other disease, and measures designed to this end are set out in the following pages.

Mastitis is an infectious disease.—The commonest cause of mastitis in dairy cows is a bacterium known as *streptococcus agalactiae,* although other types of bacteria may occasionally cause mastitis. The principal source of infection is the infected cow, but there are other sources of infection, such as contaminated yards and camping grounds.

Mastitis is spread in the milking shed.—By far the greatest spread of infection takes place in the milking shed, through milk from infected cows being carried on the hands of milkers, on machine cups, and by flies. The organisms enter the teat canal and spread up into the udder.

Sore and injured teats assist the entrance of infection.—It has been observed that mastitis often follows injuries to the teats and udder. It appears that the udder of a healthy cow may be able to resist the invasion of mastitis-causing bacteria. When its powers of resistance are lowered, the bacteria are able to set up inflammation of the udder known as mastitis.

Predisposing causes.—The incidence of the disease will be reduced if proper methods of animal husbandry are adopted. Rough handling, rough milking or stripping which may bruise the udder, allowing the machine to remain on the cow too long, particularly if the vacuum is too high, are all to be avoided.

Keep down the mud by using concrete yards and paths.

Thorough washing with soapy water followed by washing with a hypochlorite solution is essential.

Horn injury is another common predisposing factor in mastitis, and it is well to have the herd dehorned. Adequate shelter belts of timber are a particularly valuable protection against cold driving winds in exposed areas.

Symptoms and Diagnosis

The symptoms of the disease are well known to most dairymen. For convenience, mastitis may be classed into acute and chronic types, but there is a gradation between the two types.

Acute mastitis.—This type may occur suddenly, the udder becoming hard, swollen, hot and painful, with only a small quantity of discoloured and perhaps clotty milk. The health of the cow may be affected generally. Acute mastitis may cause destruction of gland tissue followed by shrinking of the quarter, which "goes light," or it may pass to the chronic form.

Chronic mastitis.—Sometimes the disease may develop in this insidious form. Chronic mastitis is often fluctuating in nature, with periods when no symptoms are noticeable. The milk is altered and changes in the texture of the udder take place. As the period of infection goes on, more and more udder tissue is damaged, so that when the udder is handled after milking, hard fibrous lumps can be felt in the quarters.

Try the cows before milking.—Changes in the milk are most noticeable in the first milk drawn from the cow, particularly before the milk is "let down," and in the strippings. The most commonly-noticed change is watery milk, while discolouration, flakes, and clots are often seen. When a little milk from an infected quarter is trickled into a strip cup or blackened saucepan lid containing some milk from a normal quarter, any abnormality present is noticeable. Flakes and clots may be easily seen by passing the first streams of milk through the fine wire gauze of a strip cup.

Prevention is Better than Treatment

Although treatment may result in clearing up the infection, the cow is often left with a badly damaged udder and a reduced capacity for milk secretion. Many cases will not respond to any known treatment. Prevention, therefore, is the aim in controlling mastitis, as it is in other communicable diseases. Here are the five salient points in the prevention of mastitis:—

1. Observe all practicable precautions of sanitation and disinfection.

Maintain constant vigilance to detect mastitis in the early stages. Try each cow with a strip cup before milking.

2. Adopt a rigid, orderly routine of rapid milking. Contented cows quickly form habits.

3. Do not introduce mastitis into the herd in infected cows—rear or buy uncalved heifers.

4. Maintain a constant vigilance to discover fresh cases as they occur.

5. Segregate cows with mastitis and milk them last.

Put the machines on as soon as the milk is "let down," to ensure rapid milking.

Sanitation—Cleanliness and Disinfection—Concrete to Prevent Mud

The great advantages of having the shed floor, yard, and approaches well drained and surfaced with concrete are obvious. Yard mud, which may be contaminated with mastitis-causing germs, also causes sore and cracked teats, themselves predisposing causes of the disease. Much time is wasted in removing the mud from the teats and udder, and often the teats are still contaminated when milking commences. To combat mud, many progressive farmers are extending narrow concrete paths from the yards out into the paddocks, with excellent results.

Wash Hands and Cow's Udder

In the shed, plenty of clean, warm, soapy water is required for washing the udders of the cows and the hands of the milker. Wipe the teats dry with a wrung-out cloth, then dip the teats in a cup of hypochlorite solution. A strength of one part available chlorine to 800 parts of water is recommended. This is prepared by adding 1½ oz. (3 tablespoons) of commercial 12 per cent. sodium hypochlorite to each gallon of water. Wash cloths should be boiled after each milking.

Clean Machines

Before the machines are placed on each cow, the cups should be immersed in a bucket of hypochlorite solution. At least once a week the inflation rubbers should be dismantled and boiled in caustic soda to remove every trace of grease.

The Cow is a Creature of Habit. Follow a Fixed Routine of Rapid Milking

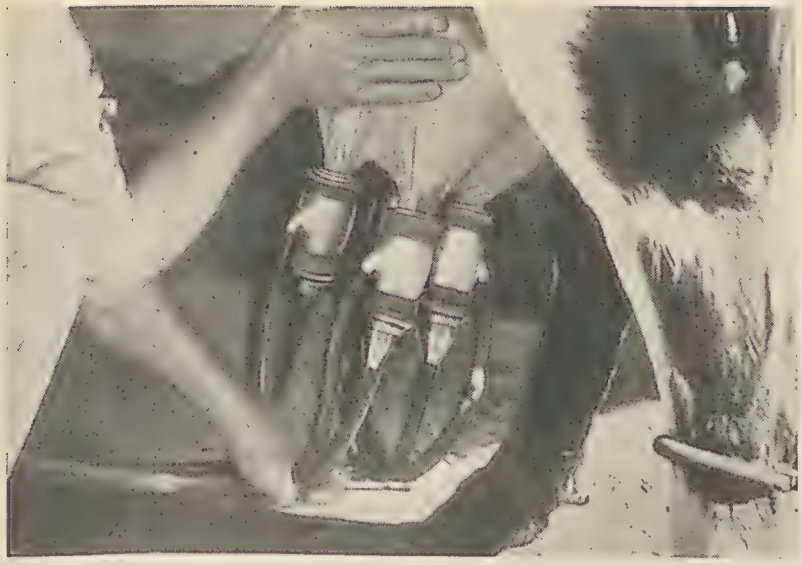
Milk is being formed in the udder all the time, but it is not until milking time that it is "let down." Washing the udder and handling the teats while examining the foremilk with a strip cup stimulate the letting down of the milk.

Avoid leaving the machines on a cow after the milk stops flowing. The cups creep up and the vacuum may cause injury.

To ensure complete and rapid removal of the milk, put the machines on as soon as the milk is let down. If there is a delay of more than a minute between washing and milking, the cow might hold some milk back, necessitating stripping.

Handle the Cows Quietly

Since the whole process of "letting down" the milk is one of stimulation and habit, it is easy to understand why rough handling and



Strip by machine. Pressure down on the claw for a few seconds, together with udder massage, will remove the need for hand stripping.

disturbances in the milking shed cause the cow to hold up her milk. Placid cows which milk rapidly require quiet handling.

Do Not Leave the Machines on the Cow too Long

As soon as the milk has ceased to flow, take the machines off. Most cows milk out within $2\frac{1}{2}$ to $3\frac{1}{2}$ minutes. If the cups are left on too long, the suction may injure the empty udder.

Strip by Machine

Most cows require no stripping if milked out rapidly. Break heifers in to non-stripping. Other cows may be stripped by machine. When the observation bowl shows that the milk flow is lessening, one hand of the operator is laid on the claw, pressing down, while the free hand massages the udder. Incidentally, this is a good opportunity to note any abnormality in the udder tissues. As soon as the milk flow ceases, remove the machine. No further stripping is necessary. Most young cows do not even require stripping with the machine. *There is no loss of milk or butterfat if the cows are milked rapidly without stripping.*

Constant vigilance must be maintained for the earliest signs of developing mastitis. As a matter of routine the foremilk of each cow should be examined before milking. At the first sign of abnormal milk, the cow should be removed from the line, and milked by hand later.

Order of Milking

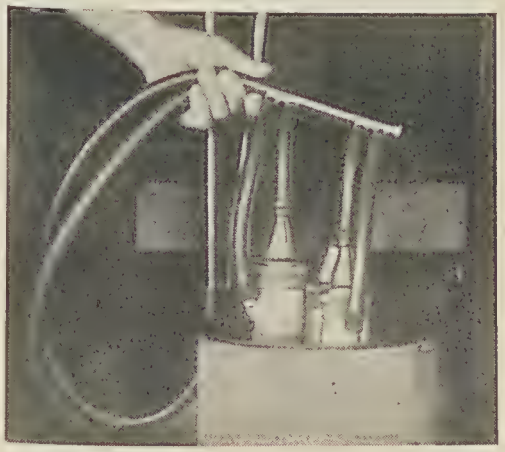
It is a good plan to grade the herd, and with a little training well managed cows will come forward to the shed in their turn. Heifers should be milked first as they are the freest from infection as a rule. Next, cows which have never had any udder trouble, followed by those with a history of mastitis, but which have apparently recovered. *Any cows with symptoms of active mastitis should be segregated and milked separately by hand after the main herd has been dealt with.* In this latter group, the udder, after being washed with soap and water, should be rinsed with hypochlorite solution before milking. After milking out the infected quarter, the milker's hands should be washed in hypochlorite solution before dealing with the other quarters.

Cull Hopeless Cases of Mastitis

Cows with seriously diseased and damaged udders are best sold for slaughter. They are a constant source of infection, and in any case, are not an economic proposition to keep on a dairy farm.

Herd Replacements—Rear or Buy Heifers

Replacements can be a source of infection. All too frequently freshly calved cows, apparently healthy when purchased, develop



Mastitis can be spread by the teat cups. Sterilize the cups in a hypochlorite solution after use in each cow.

mastitis within a few weeks. It is better to rear your own calves or purchase uncalved heifers which have not been greatly exposed to infection, than to buy another man's culls.

Treatment

Treatment of mastitis generally has disappointing results, particularly in the chronic stages. Often it is advisable to dry off the infected quarter as rapidly as possible to reduce the risk of spreading the disease.

Various treatments are recommended for acute mastitis. As early as possible after the case is noticed, gentle massage and hot foments are useful for reducing the inflammation. It is wise to reduce the quantity of concentrates in the ration for a few days.

The use of various drugs in the treatment of mastitis has been the subject of much research. A certain degree of success has been achieved in selected cases with several preparations, but none has resulted in a very high percentage of recoveries.

"Make Hay While the Sun Shines"

As part of the drive for increased production of dairy produce, farmers who are in a position to do so are urged to conserve maximum possible quantities of fodder this spring. Conservation of meadow hay and other fodders will be facilitated by the fact that tractors, mowers, sweeps and baling machinery will be available for purchase by individual farmers direct from the manufacturers or for purchase or lease to individuals or corporate bodies, such as butter factories, who agree to operate the machinery for groups of farmers.

IRRIGATED PASTURES—*continued from page 397.*

Irregularities develop through selective grazing by farm animals—an occasional "clipping" with the mower does much to keep the pasture uniform, fresh, and palatable. This applies particularly where cocksfoot or paspalum are prominent in the pastures. These grasses become coarse and innutritious when allowed to grow tall but are readily eaten when the growth is short.

The clovers in pastures are fertility builders, the droppings of the grazing stock make humus. On irrigated pasture land, well tended, there is an accretion of fertility which makes for increased production and stability on the farm.

ADVANCED REGISTER OF MERIT

Standard for Pure-bred Cows

By W. J. YUILL, Supervisor of Herd Testing

Mr. R. M. Chirnside's Jersey, "Mornmoot Princess Madeira". This cow heads the Register with a ranking of 810 lb. butterfat. Several of her progeny also occupy high positions on the Register

SINCE the inauguration of the Standard Herd Test in 1912, upwards of 45,000 production records have been listed in the 32 annual reports already published. Among the large number of cows of all breeds that have contributed to this total of individual records, a surprisingly small number has qualified for inclusion on the Standard Herd Test Register of Merit. Actually the total of such cows of all breeds to qualify since the inception of the test is but 1,101. It is, however, interesting to note that the number added to the register each year has increased greatly of late years.

The New Zealand Dairy Board's Register of Merit demands a butterfat yield (in eight years) of 2,500 lb., while the Victorian United Cow Test Association has a 1 ton butterfat register for lifetime production. At the conclusion of a cow's useful life, or at death, the certificate is endorsed with her lifetime production. In no other place is this work of lifetime yield more in evidence than in Denmark, the home of herd testing, for there, no cow can be registered in the herd book unless a minimum yield of 440 lb. butterfat is made for at least three years. Good conformation, which is decided at inspection, is also demanded.

A perusal of the tests given in the following article will indicate that the highest yielding cows in the Standard Herd Test do not suffer by comparison with the world's best. It must also be remembered that their yields have been restricted to a 273-day test period, whereas those of other countries are usually made in a 365-day period, or a period never less than 305 days. Indeed, in some countries the newer method of recording yields by the

LIST OF OUTSTANDING COWS IN THE STANDARD HERD TEST, SHOWING THE TOTAL MILK AND BUTTERFAT YIELD, ALSO NUMBER OF RECORDS AND THE MILK GIVEN IN THE LAST DAY OF TEST.

Breed.	Name of Cow.	Lactations.	Milk.	Butterfat.	Last Day's Milk.
			lb.	lb.	lb.
Jersey	Taranah Fairy	13	102,232	6,201	25
Dairy Shorthorn ..	Willow Park Cherry	10	151,880	6,000	62
Jersey	Mornmoot Princess Madeira	10	105,190	5,950	40½
,, ...	Miss Guy of Tarnpirr	11	108,812	5,874	27½
,, ...	Ballara Bonnie	10	88,600	5,690	30
,, ...	Bunty 23rd of Coliban	11	111,391	5,681	36
Dairy Shorthorn ..	Willow Park Blush	12	136,776	5,388	41
Jersey	Springfield Tomato	10	98,290	5,110	33
,, ...	Springfield Tulip 2nd	11	94,205	5,016	32½
Dairy Shorthorn ..	Willow Park Camelia	10	129,440	5,050	34½
Red Poll	Victoria Volt	10	101,730	4,440	36
,, ...	Victoria Nictitana	11	94,886	4,477	19½
Guernsey	Avon View Dulcie	11	75,581	4,279	27
Red Poll	Maryville Eve	10	91,350	4,220	31
Friesian	Victoria Lean Patch	8	118,824	4,056	33

cow-year system is rapidly gaining headway, and it has much to recommend it, for it provides a means of crediting to the cow all her yield in the year under review, irrespective of calf births or lactation.

A 273-day test period will allow sufficient time to record all the yield of cows that go dry within this time; but the quantity of milk given on the last day of testing indicates that the best cows suffer by the failure to record the full year's production. Taking a former herd-test champion's record of 600 lb. butterfat average for 10 years as an illustration, this cow was producing over 60 lb. milk a day when finishing her 273-day test. From then on until she again came under test her yield is unknown. That it would be substantial is obvious from the high yield still being recorded at the end of each test period. During her ten test years this cow averaged 42½ lb. milk when going off test.

In addition to the cows listed above, a considerable number have exceeded the 4,000-lb. butterfat level. "Willow Park Moss Rose," "Comet 7th," "Countess 9th," "Damsel," and others have also produced more than 100,000 lb. milk. There are also other good cows

Four members of the "Rutland Brunette" family (S. H. Masters and Son) ten of which have qualified for inclusion in the Advanced Register.

whose lifetime yields are not recorded because of their failure to qualify for the Advanced Register of Merit.

During the year under review, 90 new names have been added to the Register—22 less than in the previous year. In previous reports, attention has been focused on the sterling performances of the top-ranking cows and, in particular, to the long-distance high producers in the different breeds. These great producers are shown in a new light in the list of lifetime yields of milk and butterfat.

On this occasion, attention will be given to some newly qualified young cows, and to the good work being achieved in some of the lesser-known herds. Mr. W. K. Atkinson and Messrs. G. A. McNabb and Son, who own two of the largest herds under test, each have fifteen cows on the present register, while Mr. R. H. Bennett, of Lancefield, and Nancarrow Bros., of Kerang, are represented by nine and eight respectively. In the last-named herd nearly all are the daughters of "Duke of the Lake" (imp.), a well-proved herd sire. Mr. J. O'Neill, of Echuca, and P. W. Clark and Son, of Whittlesea, each have seven representatives in the tested herd.

Among the Ayrshires, Mt. Noorat "Georgina 8th," and "Killock Jupiter" (Imp.), with a four-year average of 355 and 346 lb. butterfat, are newcomers to the register.

Among the Dairy Shorthorns, "Willow Park Blush 10th" (403 lb.) also "Deep Dale Fairy" (375 lb.), "Deep Dale Cherry" (391 lb.), and "Drumneil Primrose" (371 lb. butterfat), are newly qualified with the over 400-lb. average yield when junior cow allowances are considered.

Five of the eight qualified Friesians are newly qualified. They include "Wattlebank Fairy" (404 lb.), "Wattlebank Sandhurst," "Sandra 2nd," and "Juliet," also "Victoria Woodcrest Daisy" (427 lb.), while "Victoria Rita," who heads the Friesian section, has an average yield of 439 lb., for her first four lactations.

Among the Guernseys, "Dainty" (414 lb.), "Avonview Elaine," and "Avonview Dulcie" represent Mr. A. Fixter's "Avonview" stud at Boisdale. The latter cow, now in her fourteenth year, is still doing well, as is evident from her 429-lb. yield last year. Her actual butterfat total to date is 4,297 lb.

The first six cows in the list are all from Captain A. E. T. Payne's stud, "Yarraview Julie," being the leading Guernsey with a seven-year average of 533 lb.

Top—Mr. P. J. Maloney's mature cow "Belgonia Junette 5th", a top-ranking Jersey on the Advanced Register. Middle—"Ballara Bonnie" (Estate F. A. Williams) is another outstanding cow on the Register. Lower—Mr. W. K. Atkinson's Dairy Shorthorn cow "Willow Park Cherry", one of the foundation cows of the "Willow Park" Stud.

"Victoria Volt" (ten-year average of 444 lb.), and "Maryville Eve" (ten-year average 422 lb. butterfat), are still the outstanding Red Polls on the list. Good yields are recorded from "Victoria Kinetica" (seven years, 414 lb.), and "Victoria Maid Marion" (seven years, 379 lb.).

Some Excellent Performances by Junior Cows

During the year, some excellent young cows have been added to the list. They include "Belgonia Gem's Noella 4th" (555 lb.), "Belgonia Junette 7th" (535 lb.), "Belgonia Suspense 10th" (516 lb.), and "Belgonia Buttercup 5th" (434 lb. butterfat). All four

are daughters of "Aim High" (Imp.). As will be seen, they represent prominent families at the "Belgonia" stud. With their age allowances, the yields of these cows have placed them high on the advanced register.

The Champion Herd is also well represented. "Mornmoot Mimi" (559 lb.), "Mornmoot Madeira 9th" (586 lb.), and "Mornmoot Fancy Madeira 6th" (481 lb.), all have five-year averages; while "Mornmoot Starbright 4th" (467 lb.), and "Mornmoot Princess Northwood" (455 lb.), with four-year averages, are all in the first 30 of the Jersey section of the register.

"Carellen Lady Margaret" (494 lb.), "Wonga Park Songbird" (461 lb.), "Karrara Perree's Primrose" (497 lb.), and "Tooravale Princess 28th" (491 lb.), are all newly qualified Jerseys on their first four lactations.

Mr. Chirnside's old champion, "Mornmoot Princess Madeira," still heads the register with a ranking of 810 lb. butterfat. "Werribee Grandmaster," her sire, left some remarkably good progeny in the "Navuloa" stud of Messrs. H. W. Waterhouse and Son. His twelve tested daughters are all on the advanced register except one—which missed by reason of time—although her yields were adequate. Another great daughter of "Grandmaster," is "Werribee Mimi," which averaged 629 lb. butterfat on her three tested years prior to being sold.

An outstanding feature of the register is the appearance of so many daughters of prominent "Advanced Register" cows. All qualified cows will be retained on the register for a period of four years after their last test record is made. Any one requiring an earlier copy of the register may secure one on application to the Superintendent of Dairying, Department of Agriculture, Melbourne, C.2.

A full list of cows which have qualified to be placed in the Advanced Register of Merit will appear in the Standard Herd Test booklet, to be published towards the end of September. Free copies of this booklet may be obtained after 1st October from the Superintendent of Dairying.

Accredited Brucellosis-free Herds (Swine)

The following herds of pigs have been accredited as free of swine brucellosis (contagious abortion of pigs) by the Department of Agriculture.

An accredited brucellosis-free herd of pigs is one in which all animals therein have been subjected to two successive blood tests for brucellosis with negative results at intervals prescribed by the Chief Veterinary Inspector of the Department.

In order to remain accredited, a semi-annual or annual re-test (as determined by the Chief Veterinary Inspector) of all animals in the herd shall be conducted. If at a re-test any animal fails to give a negative reaction to the test, the herd shall not be declared brucellosis-free again until two tests of the complete herd have been carried out with negative results.

Full particulars of the Accredited Swine Brucellosis-free Herd Scheme and application forms may be obtained from the Chief Veterinary Inspector, Department of Agriculture, Melbourne, C.2.

Name.	Address.	Name.	Address.
Abrahams, L. J. ..	Red Hill South	Haywood, Dr. A. R. ..	Hastings
Beechy, K.	Pomborneit	Horn, L. A.	Leongatha North
Bidgood Bros.	Staghorn Flat	Longerenong College ..	Dooen
Bodey, A. A.	"Bonnyview," Dooen	Noble, T. M., and Sons ..	Maffra
Bright, George H. ..	Dumbalk	Northcote Children's Farm	Bacchus Marsh
Buller R. A.	Beaconsfield	Pietsch, R. E.	Katyil
Castle, L. H.	Clarinda	Rintoul, J. T. C. ..	Glengarry
Critten, H. S.	Dumbalk	Roy, W. A.	Morrell's Hill, via Boolarra
Dookie Agricultural College	Dookie	State Experiment Farm ..	Rutherglen
Doornbusch, John L. ..	"Starpark," Nhill	Trenery and Soderlund ..	"Promview," Foster
Ellwood, A. H. ..	Paschendaele	Trigg, A. J.	Bungaree
Fairchild and Clutterbuck	Tinamba	Trigg, N. H.	Bullarook
Hamblin, A. T., and Sons	Toolleen	Tweddle, J. T.	"Winlaton," Shepparton
Harrison, C. T... ..	"Eastside" Stud, Pomborneit	Warry, A., and Sons ..	Delburn
Hawtin, I. E. and F. ..	"Rossmoyne," Colac	Whelpton, B.	Whittlesea North
		White, G. W.	Boolarra South

Burnley Egg-Laying Competition

Results of Winter Test

By H. F. CLINTON, Poultry Expert

THE Thirty-fourth Egg-laying Competition for fowls, conducted by the Department of Agriculture, at the School of Primary Agriculture and Horticulture, Burnley, commenced on 1st April, 1944, and will continue until 2nd March, 1945, a period of 48 weeks.

The competition this year is limited to the section for Individual Birds—Single Test, as in the previous competition.

The winter test, conducted in connection with this competition, included the first four months (122 days), and concluded on the 31st July last. This test is held annually to give prominence to birds that lay well during this period, when eggs are scarce and prices are high. In this test, certificates are awarded for the greatest number of first-grade eggs laid by individual birds in all classes, provided that a bird lays 60 first-grade eggs. During the first two months, a first-grade egg must weigh not less than $1\frac{3}{4}$ oz., and thereafter not less than 2 oz.

The eggs laid by the prize-winning birds were practically all first grade, as was the case last year. Some very high scores were recorded. In the 122 days of the test, a White Leghorn, six Australorps, and a White Wyandotte, each laid 100 first-grade eggs or more, and in all classes of the competition eighteen other birds each laid 90 first-grade eggs or more. The highest number of first-grade eggs laid by a bird in all classes of the competition was recorded by an Australorp entered by Mr. C. E. Graham. This bird laid 117 eggs, all of which were first grade, in the 122 days—five eggs more than the highest number laid by a bird (also an Australorp), for the same period, in the Winter Test last year.

Individual Birds—Single Test

In the class for White Leghorns fed on wet mash, Messrs. C. and K. Langdon won first prize with a bird that laid 100 eggs, all first grade. Mrs. K. C. McKenzie gained second prize with a bird that laid 97 eggs, and Mr. A. McIlvain's entry was third with 95 eggs.

In the White Leghorn class, fed on dry mash, first prize went to a bird entered by Mr. V. R. Milligan with a total of 99 eggs, all first grade. The Goulburn Valley Stud (J. E. Coupar), gained second prize with a bird that laid 98 eggs, and Mr. V. R. Milligan's bird was third with 95 eggs.

In the class for All Light Breeds, other than White Leghorns, first and second prizes were

won by the Nest Poultry Farm (M. Hanham), with Anconas that laid 79 and 66 first-grade eggs respectively.

As stated earlier, Mr. C. E. Graham won first prize with an Australorp which laid 117 eggs, all first grade. Mr. A. G. Beswick gained second prize with a bird that laid 111 eggs, and Mr. T. J. Crewther's entry was third with 110 eggs

The Kyvale Poultry Farm (L. Day) obtained first grade in the class for Rhode Island Reds, with a bird that laid 93 eggs, all first grade. Second prize was awarded to Mr. E. Ikin, with a bird that laid 81 eggs, and the Kyvale Poultry Farm (L. Day) was third with 66 eggs.

First prize in the class for All Heavy Breeds, other than Australorps and Rhode Island Reds, was awarded to Mr. D. Granter, whose White Wyandotte laid 103 first-grade eggs. Mr. T. Hinton gained second prize with a Light Sussex that laid 93 eggs, and Messrs. Wilkinson Bros. secured third prize with a Light Sussex that laid 86 eggs.

Winter Test Prize List, 1944-45

INDIVIDUAL BIRDS—SINGLE TEST

Pen No.	Name and Address.	Total Eggs.	Under-weight.	First Grade Eggs.
	Class 1.—White Leghorns—Wet Mash.			
	First Prize—Champion Certificate.			
135	C. and K. Langdon, Bullock Swamp, Colac	100	..	100
	Second Prize—Government Certificate.			
148	Mrs. K. C. McKenzie, 82 Clarence-street, Geelong West	100	3	97
	Third Prize—Government Certificate.			
145	A. McIlvain, 24 Harbury-street, Reservoir, N.19	95	..	95
	Class 2.—White Leghorns—Dry Mash.			
	First Prize—Champion Certificate.			
211	V. R. Milligan, State School No. 3426, Ultima	99	..	99
	Second Prize—Government Certificate.			
199	Goulburn Valley Stud (J. E. Coupar) Box 18, Nathalia	102	4	98
	Third Prize—Government Certificate.			
212	V. R. Milligan, State School No. 3426, Ultima	96	1	95
	Class 3.—All Light Breeds, other than White Leghorns—Wet Mash.			
	First Prize—Champion Certificate.			
100	The Nest Poultry Farm, (M. Hanham) Five Ways P.O., via Cranbourne (Ancona)	79	..	79
	Second Prize—Government Certificate.			
99	The Nest Poultry Farm, (M. Hanham) Five Ways P.O., via Cranbourne (Ancona)	66	..	66
	Class 4.—Australorps—Wet Mash.			
	First Prize—Champion Certificate.			
17	C. E. Graham, Portarlington	117	..	117
	Second Prize—Government Certificate.			
3	A. G. Beswick, Exeter, Tasmania	111	..	111
	Third Prize—Government Certificate.			
9	T. J. Crewther, Carlow-street, East Bentleigh	110	..	110
	Class 5.—Rhode Island Reds—Wet Mash.			
	First Prize—Champion Certificate.			
79	Kyvale Poultry Farm (L. Day) Box 39, Kyabram	93	..	93
	Second Prize—Government Certificate.			
75	E. Ikin, 44 Mackay-street, Seddon	81	..	81
	Third Prize—Government Certificate.			
80	Kyvale Poultry Farm (L. Day) Box 39, Kyabram	66	..	66
	Class 5.—All Heavy Breeds, other than Australorps and Rhode Island Reds—Wet Mash.			
	First Prize—Champion Certificate.			
57	D. Granter, 163 Martin-street, Gardenvale (White Wyandotte)	109	6	103
	Second Prize—Government Certificate.			
59	T. Hinton, 55 Lexton-road, Box Hill (Light Sussex)	93	..	93
	Third Prize—Government Certificate.			
66	Wilkinson Bros., Ben Nevis, via Ararat (Light Sussex)	86	..	86

PIGS are Fewer—
But BIGGER and BETTER

By L. A. DOWNEY, H.D.A., Pig Expert

THERE are more than 20,000 farmers raising pigs in Victoria. To the majority of them, pig production is a relatively small part of their farming business, but collectively they form an industry producing annually about £2,000,000 worth of meat in its carcass form, and contributing a substantial part of the diet of this and other nations.

The following review, on similar lines to one published in the March, 1944, issue of this *Journal*, is to give individual pig raisers a better appreciation of the part they are playing in the Australian pig industry.

The table shows Australian and Victorian production of pig meat expressed as tons of carcasses, the quantities having been calculated from statistics issued by the Commonwealth Bureau of Census and Statistics. Some of the more recent statistics are subject to revision.

During the six months ended June, 1944, the production of pig meat in Australia (52,083 tons), and in Victoria (12,213 tons), was much greater than in the previous six months, and it was also greater than in the six months ended June, 1943. This recent increase was due, in part at least, to the slaughter of those pigs which as porkers were precluded from slaughter since August, 1943. For that reason, and because of the normal seasonal decrease, production of pig meat is not expected to be as high in the second half of 1944 as it was in the first half.

It is obvious that the production goals of 143,000 tons of pig carcasses for Australia and 30,000 tons for Victoria, which were fixed

PIG PRODUCTION AS CARCASSES.

Period (Year.)	Australia.	Victoria.	Victoria's Percentage of Australian Production.
	tons.	tons.	
1937–38 ..	85,867	24,907	29
1938–39 ..	86,838	21,824	25·1
1939–40 ..	96,196	22,236	23·1
1940–41 ..	110,343	28,752	26
1941–42 ..	122,594	28,601	23·3
1942–43 ..	100,654	23,469	23·3
1943–44 ...	95,214	21,874	23

by the Commonwealth Food Controller last September for the year ending December, 1944, will not be achieved.

When, in 1942, changing war conditions made it necessary to arrest the decline in pig breeding and to stimulate production of pig meat to the maximum in the shortest possible time, it was generally recognized that the most practical means of achieving this end was to make the available pigs heavier for slaughter. This would have been desirable even if it had necessitated some sacrifice in carcass quality through excessive fatness. It should, therefore, be a matter for satisfaction to Victorian pig producers that the average weight of carcasses has increased without any loss of quality.

Baconer weights in Victoria have always been heavier than those of other States, and, in consequence, Victorian pig raisers were able to take advantage of the situation when conditions of the Pig Meat Acquisition Plan were altered to raise the maximum weight of top-priced baconers above the originally-proposed 150-lb. limit, first to 160 lbs., then to 180 lbs., and finally in September, 1943 to 200 lbs.

With the maximum weight for baconer carcasses at 200 lb., pig raisers were able to aim at marketing at an average weight of 170 lb. to 180 lb. without much risk of making some of their pigs over 200 lb., and incurring the price penalty imposed under the plan.

The table shows the average carcass weights for Australia and for Victoria of (*a*) all pigs slaughtered, including porkers, baconers, backfatters and choppers, and (*b*) baconers, for the five years 1937-38 to 1941-42 and for the last two years.

Pigs.	Period.	Australia.	Victoria.
		lb.	lb.
All pigs	Average carcass weight for five years, 1937–38 to 1941–42 ..	116	113
	Year 1942–43 ..	106	111
	Year 1943–44 ..	118	129
*Baconers	Average carcass weight for five years 1937–38 to 1941–42 ..	138	147
	Year 1942–43 ..	132	160
	Year 1943–44 ..	141	171

* Calculated from cured weight on assumption of cured weight being ¾ of carcass weight.

Observations by the writer and opinions obtained from people engaged in the pig industry indicate that quality has at least been maintained as the average weight of baconers has increased.

Baconer quality often is a matter of opinion based on casual observations of pigs, carcasses and bacon at farms, markets, meat works, and in stores, but records of continuous grading of carcasses carried out by one man under constant conditions are of greater value. Such grading records have been made available to the writer by the management of one of the largest bacon-curing works in Victoria whose pigs are a representative sample of the State's production, being obtained from all districts and representing all breeding and feeding practices; further, they include pigs purchased both at auction and direct from farmers. They do not include a high proportion of the best or the worst pigs, but are mostly of an intermediate class in regard to weight and grade.

The grading records of this factory show 78 per cent. prime pigs in the six months ended June, 1943; 78 per cent. prime pigs in the six months ended December, 1943; and 86 per cent. prime pigs in the six months ended June, 1944.

The progressive increase in the weight of bacon pigs without an increase in the percentage of excessively fat pigs is testimony of the skill of pig raisers and justification of breeding and feeding practices in Victoria. It has been achieved mainly by selective breeding toward larger type pigs with a reduction of the number of small type breeding stock. This practice has allowed farmers to grow their pigs quickly and economically to heavy baconer weights without excessive fatness. In some cases where stock of the smaller type has been used, restrictive feeding has been adopted to get pigs to heavy weights without excess fat. This practice gives slower rates of gain in weight.

It should be realized that over-fatness is not confined to pigs of the heavier weights, but over-fat pigs are still found in all weight groups.

By skilful manipulation of heredity and feeding, it is possible to produce the degree of fatness which consumers require in carcasses of any weights, but to be able to do this it is necessary for pig raisers to keep themselves acquainted with trade requirements.

Pig raisers are guided by the discrimination of buyers at auction, by carcass grading and the payment of a premium for quality, as has been practised by some companies, and by educational publicity and demonstrations on pig carcasses.

A New Virus Disease of Carrots

By L. L. STUBBS, B.Agr.Sc.,* and B. J. GRIEVE, M.Sc., Ph.D.†

The paper published hereunder records the presence in Australia of a new virus disease of carrots, which has been responsible for partial and in some cases complete failure of carrot crops in this State over a number of years. The virus is carried by a common aphid pest of carrots which is widely distributed. The work has demonstrated the presence of carrot varieties tolerant to this disease, and further investigation on this aspect is in progress.

A DISEASE affecting carrots was reported in recent years from the Melbourne market garden areas. Over the past two years the disease has also been observed in the newly developed carrot-growing areas of Gippsland and the Western District of Victoria.

The severity of the disease is such that successful crops of the usual commercial varieties can be grown only during the summer months. The disease has seriously affected the even distribution of carrot supplies throughout the year.

This paper is a preliminary report of the results of an investigation commenced in 1941.

Symptoms

Symptoms vary considerably from plant to plant and also with the age of the plant. The outstanding impression gained from an infected crop is an unthriftiness of growth suggestive of a mineral deficiency. Closer inspection of individual plants shows that leaf growth is markedly stunted relative to healthy plants.

For convenience of presentation symptoms are described on plants infected at different age levels.

(*a*) **Young plants (3-4 fern-leaf stage).**—The earliest symptom which develops is a reduction in length and a slight twisting of the petiole of the leaf which emerges immediately following infection. The individual leaflets of the leaves which subsequently emerge are reduced in size. A chlorotic condition (almost a mosaic of light and dark-green areas) next becomes manifest in the leaves; leaf petioles become twisted and the plant remains stunted (fig. 1). Such plants fail to produce marketable roots (fig. 2).

(*b*) **Plants at an intermediate stage of development.**—Plants show stunting of leaf-growth relative to healthy plants. Petioles and sub-petioles are frequently twisted; those of older leaves are sometimes twisted in an "S"-shaped manner, or bent backwards so that the under surfaces of the leaves face upwards. The groove along the petiole of twisted leaves is thrown into relief. Individual leaflets are twisted, distorted, and reduced in size. The outer leaves develop an irregular chlorotic mottle which is ultimately replaced by a marginal chlorosis and a marginal reddening, in that order (fig. 3). The inner leaves show some chlorosis.

(*c*) **Plants approaching maturity.** — In general the severity of symptom expression increases with the age of the plant. Petioles of leaves which emerge immediately following infection are distorted, twisted and reduced in

Fig. 1—(Left) Inoculated on 2.5.44 with infective (left) and non-infective (right) Cavariella Aegopodii. Fig. 2—(Right) Same plants as in Fig. 1, showing relative root development.

* Biological Branch, Department of Agriculture, Victoria.

† Botany Department, University of Melbourne.

length so that inner leaves present a bunched or rosetted appearance. Petioles of these leaves are brittle and sometimes exhibit brown necrotic streaks. The outer leaves developed prior to infection generally remain unaffected (fig. 4).

Fig. 3—Outer leaves from a healthy and a diseased plant. Note chlorotic mottle, and petiole and sub-petiole twisting of the diseased leaf. Fig. 4—Plant infected when approaching maturity, showing rosetting of inner leaves. Fig. 5—Disease tolerance exhibited by the Osborne Park variety at a metropolitan market garden. The susceptible variety at right (Manchester Table) was sown at the same time and received identical treatment. Fig. 6—Typical roots of Osborne Park variety (left) and Manchester Table (right).

Nature of the Disease

(*a*) **Experimental transmission.**—The virus nature of the disease has been amply demonstrated by insect transmission experiments. Experiments were performed under controlled conditions to test leaf-hoppers and aphids found feeding on diseased plants. No infection was obtained when leaf-hoppers were fed on healthy plants, but a common aphid pest of carrots (since provisionally identified as *Cavariella aegopodii Scopoli* by E. H. Zeck, Entomologist, New South Wales Department of Agriculture), has been consistently found to transmit the disease. A number of infection experiments have been performed using *Cavariella aegopodii* transferred directly from plants in the field to healthy plants growing in insect-proof cages. All have been uniformly successful.

In further experiments aphids originally present on diseased carrots were transferred to *Salix vitellina*, where they were reared for several generations. No disease symptoms were ever observed on these willow plants, and when these aphids were retransferred to healthy carrots no disease developed. These experiments indicated that *Salix vitellina* (a host on which *Cavariella aegopodii* is commonly found) was not susceptible to infection and that the ability to transfer the carrot virus was not heritable in the progeny of originally infective aphids.

The aphids reared on *Salix vitellina* then served as a source of healthy aphids for further transmission experiments. Colonies of such healthy aphids were also reared for experimental use on healthy carrots. After feeding these aphids on diseased carrot plants and transferring them to healthy plants, typical symptoms developed after an average incubation period of seventeen days. The shortest time for the appearance of symptoms in these experiments was fourteen days.

Experiments are in progress to determine whether the virus is of the persistent or non-persistent type in relation to its vector. Other experiments are being directed towards ascertaining whether aphids other than *Cavariella aegopodii* can also transmit the disease.

Repeated trials, using a variety of methods, have so far failed to demonstrate transmission of the carrot virus by mechanical means.

(*b*) **Relation between infestation of plants with Cavariella aegopodii and incidence of the disease.**—A close relation has been found between the appearance of *Cavariella aegopodii* on carrots and the appearance of symptoms. Observations at Burnley in 1943 showed that the aphid appeared in considerable numbers in October and persisted until the second week in December. Carrots sown in July, August and September did not develop symptoms until October. At Lindenow sowings made prior to November were infected, while November and December sowings were healthy. A similar picture was formed at

[*Continued on page* 415.

Live Stock Notes

Compiled by
A. C. T. HEWITT, M.Agr.Sc.,
Live Stock Science Officer

Dairy Cows and Sheep

PROBABLY the most serious obstacle to increased production facing dairy farmers at the moment is the acute fodder shortage. Sheep owners, too, are seriously troubled by the shortage. During the past few years, practically the whole of the State's fodder reserves has been used and, with the exception of wheat grain and wheat by-products, such as bran and pollard, all the feed required for next year's supplementary feeding will have to be harvested this season. The quantity of hay grown and harvested for sale will again be short of requirements, even if the season is better than the average—which appears most unlikely in northern Victoria. Dairy farmers and graziers, therefore, should conserve every available ton of surplus pasturage as hay or silage.

Even though prospects of abundant spring growth are not good in some districts, particularly in the north and north-west, preparations should be put in hand for the harvest season. All paddocks which are not necessary for spring grazing should be closed. Stack-yards, hay-sheds and silos should be tidied up in readiness for the hay or silage. Machinery should be oiled and overhauled to ensure that it is in good working order. Labour requirements should be estimated and preliminary arrangements made for hiring labour; obtaining the co-operation of neighbours; employment of friends, who are in other forms of employment and able to obtain leave; obtaining seasonal leave for men in the services, and engaging a contractor, &c.

Dairy farmers are being asked to produce to the utmost so that Victoria may supply the maximum quantity of butter and other dairy products to the people of Great Britain.

Food for the dairy cows has been the main factor bringing about yearly rises and falls in the production of dairy produce. In a good season when there is abundant pasturage, there is record production. Since the outbreak of war, seasons have been average, but production has fallen each year on account of increasing shortages of feed as well as of labour. Less and less hay and silage have been conserved on dairy farms. Less cereal hay, oats and feed barley have been grown for sale, and, until recently, less bran and pollard have been manufactured.

Shortage of labour has been one of the principal causes of this decline in fodder conservation and production of dairy farms. The existing labour has been sufficient for the milking of within 10 per cent. of the pre-war number of cows, but, because of shortage of fodder, production has dropped by 25 per cent. The present dairy-cow population is sufficient to produce all the required dairy produce if the cows can be adequately fed.

The dry season in the main cereal-growing districts will result in low yields of cereal hay, oats and barley. The increase in bran and pollard manufacture will be more than offset by low oat yields, therefore dairy farmers and other stock feeders are advised to conserve the greatest possible proportion of their own feed requirements as pasture hay or silage.

For some considerable time, wheat will comprise a large proportion of live-stock rations. Record quantities of ground wheat are now being fed to dairy cows with very satisfactory results. Wheat is fed to cows in conjunction with chaff, bran, linseed meal, and other "leavening" foodstuffs, while whole wheat is one of the few rations available to sheep owners. Information on the feeding of wheat is set out in the pamphlet, "Wheat as a Solution to the Stock Feeding Problem," which will be posted, free of charge, on application to the Director, Department of Agriculture, Melbourne, C.2.

One Ton of Pig Meat per Breeding Sow

Two litters of seven pigs each, reared to an average dressed weight of 160 lb., give 1 ton of pig meat. Such a yield from one brood sow each year is possible, but it is only rarely attained, and is too high to be expected from a large proportion of the breeding sows in use.

Statistics show that, in Australia, the average production of pig carcasses per breeding sow is about ½ ton per annum from about 10 pigs, including porkers, baconers, backfatters and choppers slaughtered.

It is not too much to aim at a production of ¾ ton of carcass per breeding sow yearly, and such a yield would just about meet Australian requirements of pig meat for this year.

The average carcass weight of all pigs slaughtered in Victoria in 1943 was 124 lb., the average weight of the carcasses used for bacon and ham production being 166 lb., which was 13 lb. higher than in the previous year.

As pig carcasses from 101 to 200 lb. are classed as baconers, and many pigs in this class are 180 lb. or more, there is still scope for increasing the total weight of pig meat by carrying the lighter baconers on to heavier weights before killing them. Such action will give the desired production for 1944, and provided necessary adjustments are made to feeding practice pending changes in breeding to meet the demand for leaner pigs, good carcass quality can be maintained.

[L. A. Downey, H.D.A., Pig Expert.]

Poultry

Egg production is the most profitable branch of poultry keeping in Victoria when conducted on a large commercial scale, and the breeds of fowls most suitable for this purpose are White Leghorns and Australorps. White Leghorns are kept in the greatest numbers, and for this reason, the average quality of table birds marketed in Victoria is far below that of other countries where some of the other breeds which have been specially bred for meat production are kept in large numbers. In cities where there is a large tourist traffic, there is keen competition and a greater demand for a superior class of table poultry bred specifically for the purpose.

In view of the high prices being realized for table poultry on the local market, and which should be maintained while meat rationing continues, there can be no doubt that individual producers and farmers who run a few fowls as a side-line could produce table birds of the best quality if suitable breeds were kept for the purpose.

The White Leghorn and Australorp, having no complicated feather colour-markings, present no breeding difficulties in this regard, but some of the other breeds have always been difficult for the breeder who is not a specialist to maintain the standard type and colour of the breed over many generations. In this way the original identity of the breed soon becomes lost. With a breed like the Rhode Island Red, however, there should be little trouble to retain standard type and colour.

The Rhode Island Red, as will be gathered from the name, is an American breed of fowl. It is a very attractive bird with a rich, brownish-red plumage.

The Rhode Island Red Club in Victoria has done much to popularize this excellent dual-purpose breed, and some high scores in egg production have been recorded at the Burnley egg-laying competitions. There are some good flocks of Rhode Island Reds in Victoria, and the production of table poultry from this breed and its crosses is recommended.

A cross possessing a sex-linked character may be made by mating a Rhode Island Red male with a Light Sussex female, and as the male chickens carry the plumage of the Light Sussex they may be separated from the females at the time of hatching.

[H. F. Clinton, Poultry Expert.]

Bees

Much waste can take place in the feeding of bees if correct methods are not adopted. Open-air feeding is often resorted to by apiarists, but this is one of the worst methods, as it is a great drain on the physical capacity of the field bees, and generally sets up turmoil in the apiary by robbing, weak colonies often being killed outright.

Many feed-containers are listed in bee-keepers' catalogues, but the simplest and most convenient is the 7-lb. honey or treacle tin used in an empty hive body above the bee cluster. A number of small nail holes are made in the lid, and the full can of food is then inverted above the bees with the nail holes touching the cluster. To prevent the colony heat from escaping too freely from the cluster, packing material is placed around the can inside the empty hive body or super. A bag mat with a hole, cut to receive the can directly above the cluster, is ideal for this purpose. If sugar syrup is used, it should be made by mixing equal quantities of sugar and water by volume. Mix with boiling water, stir well to dissolve all of the sugar crystals, and feed warm if weather is cold. If no feeders are available, syrup may be poured into the empty combs and placed in the hive beside the cluster. If honey is to be used for insertion to the comb, it has to be broken down before use. Empty combs can be filled over an ordinary wash tub. Mix the syrup in the tub, and, when cooled down, pour into the comb, which is held at an angle of about 30 degrees. If the container is held about 18 inches above the comb, the force of the falling syrup drives the air from the cells. When filled, the combs should be placed in supers, and the surplus syrup allowed to drain into some receptacle. If handled with care, and securely fastened in the supers, the filled combs can be carried out to the apiaries without much loss.

Syrup can also be inserted into combs from a 60-lb. honey tin taken from hive to hive, by the use of a spray pump, or by pressure from a container strapped to the operator's back.

Combs of good wintering honey are the best food, if available.

If daytime feeding causes extensive robbing, carry out the operation at dusk when the bees have finished flying.

It is preferable to feed during the hours of darkness than to cause turmoil and extensive robbing during daylight.

[W. A. Collins, Apiary Inspector.]

A NEW VIRUS DISEASE OF CARROTS—*continued from page 412.*

Orbost and Bruthen, where spring sowings were diseased and December sowings were healthy. No aphids were found in these areas in inspections during early February.

(*c*) **Comparison with other virus diseases of carrots.**—The virus appears to be a new record. In some respects the symptoms described for Aster Yellows on carrots (Severin 1932) resemble this disease. Aster Yellows differs, however, in being transmitted by a leaf-hopper. Moreover, because of its wide host range, it is likely that Aster Yellows would have been previously recorded had it been present in Australia.

Western Celery Mosaic virus also produces somewhat similar symptoms on carrot (Severin and Freitag 1938), but differs from this disease in being mechanically transmitted.

Varietal reaction

In field tests the following varieties were susceptible to the disease:—Chantenay, Danvers Half Long, Hutchinson's, Imperator, Nantes, Morses Bunching, Oxheart, Short Horn.

A variety commonly referred to in this State as the West Australian variety (Synonyms—Osborne Park, Champion Long Red, Champion Intermediate), and a Victorian grower's selection of a similar type possess a high degree of tolerance to the virus (fig. 5).

References

Severin, H. H. P., 1932. "Transmission of Carrot, Parsley, and Parsley Yellows by *Cicadula Divisa*." *Hilgardia* 7, 163-179.

Severin, H. H. P. & Freitag, J. H., 1938. "Western Celery Mosaic" *Hilgardia* 11, 495-558.

War Agricultural Committee Notes

Compiled by The Central Executive

A BRIEF *résumé* of the procedure necessary to obtain the release of farmers' requirements was given in the *Journal* of October, 1943. It is now intended to revise the list given to bring the information up to date. The list has been divided into two sections the first containing those items which must be sponsored by the War Agricultural Committees, and the second, those which do not require such certification.

Attention is particularly directed to the items—Building Permits, Fencing Materials, and Tractor Tires, in respect of which the procedure has been substantially altered.

SECTION 1.

(*a*) *Building Permits:*

Regulating Authority—Department of War Organization of Industry, 187 Collins-street, Melbourne.

The National Security (Building Operations) Regulations have recently been amended. Under these amended Regulations it is necessary for a farmer to obtain a written permit before he may commence any work on repairs or maintenance of structures on the farm or the erection of new buildings. All work for the provision of water, gas, electricity, sewerage, and heating is included in the building operations mentioned above. However, a written permit is not required for any work for the provision of fencing, drainage or irrigation for agricultural purposes or where the total cost of all building operations on the farm does not exceed one hundred pounds (£100) in any one financial year (1st July to 30th June).

Farmers desiring to carry out building operations for which a permit is required should apply, in writing (in ordinary letter form), to the Deputy Director, Department of War Organization of Industry, giving details and dimensions of the building, materials to be used, and the estimated cost. Should the application be for authority to erect a new house, plans and specifications are required and should be attached.

Where necessary the Department of War Organization of Industry will request the applicant to obtain the certification of the Local War Agricultural Committee or Dairy Supervisor.

(*b*) *Materials Supply:*

1. Ammunition Supplies.

Each primary producer is entitled to 25 12-gauge shotgun cartridges and/or 50 ·22 rimfire rifle bullets per year to destroy certain stipulated pests. This issue is obtainable by applying at the nearest police station for a permit, which is then lodged with the retailer with an order for the ammunition. Ammunition can be obtained only on presentation of a permit issued by the police, and such a permit will be issued to primary producers only. The pests include birds damaging fruit in orchards, birds and animals attacking poultry and other live stock, and hares, in organized drives. Where necessary for the control of pests, the issue of further ammunition may be sponsored by the chairman of the Local War Agricultural Committee.

2. Baling Wire.

Controlling Authority — Directorate of Materials Supply, 532 Bourke-street, Melbourne.

Applications on the appropriate form should be forwarded to the Local War Agricultural Committee for sponsorship. The form should be lodged with the local merchant when placing an order, and will then be sent to the wholesaler who will refer it to the Directorate of Materials Supply for release.

3. Electricity.

The applicant should interview the Local Electric Supply Authority to ascertain whether his requirements can be met. If they can, the Supply Authority will then forward the application to the District War Agricultural Committee for certification. Applications rejected by the Supply Authority may be submitted to the District War Agricultural Committee, and will be reviewed by these bodies in collaboration. Applications for electricity supply for food production will include supply for

domestic purposes unless the contrary is specifically stated by the applicant. Applications for supply for domestic purposes *only* will not be considered by the District War Agricultural Committees.

4. Fencing Material.

The only types of fencing materials available at present are:—

(i) Plain, galvanized wire, 10 gauge and 12½ gauge H.T.

(ii) Barbed wire, black—surplus army stocks.

(iii) Wire Netting, Galvanized—
12 in. x 1½ in. x 17—in 100-yd. rolls
42 in. x 1½ in. x 17—in 100-yd. rolls
For Poultry Farming—
36 in. x 2 in. x 17—in 50-yd. rolls
36 in. x 1 in. x 20—in 50-yd. rolls
36 in. x ½ in. x 22—in 50-yd. rolls
72 in. x 2 in. x 17—in 50-yd. rolls

(iv) Pig Fencing, Ringlock high tensile (8 wire x 30 in.), in 5-chain rolls. For Pig-Raising Only.

(v) Steel Posts, 5 ft. 6 in. long—available *only* for renewal of boundary fences destroyed by bushfires and floods.

The black barbed wire listed above may be obtained through the normal trade channels without written application being made. Price: £18 10s. per ton, plus freight.

All other fencing materials are under the control of the Directorate of Materials Supply, which releases farmers' requirements on the recommendations of the Local War Agricultural Committees. Applications on the appropriate form should be sponsored by the Local War Agricultural Committees and lodged with the local merchant when placing an order. The form is then forwarded to the wholesaler who will refer it to the Controlling Directorate for authority to supply.

5. Asbestos Cement Sheeting.

Controlling Authority — Directorate of Materials Supply, 532 Bourke-street, Melbourne.

Applications should be made on the special form (A.C.1), certified as essential by the Local War Agricultural Committee and lodged with the local merchant with the appropriate order. If the merchant has a trading stock on hand an order may be supplied immediately providing the form has been certified by the Local Committee.

6. Tractor Tires.

(i) *New Equipment*: Applications for new tractors equipped with rubber tires should be lodged with the machinery agent on the Agricultural Machinery Application Form B. This will then be forwarded to the Local War Agricultural Committee who will certify as to the essentiality of the tractor and the rubber tires separately. The form is then forwarded to the Central Executive of the War Agricultural Committee which issues a permit to supply, if approved.

(ii) *Replacements*: Applications on the appropriate form should be lodged with the Local War Agricultural Committee who will forward it, together with their report thereon, to the Central Executive. If supply is approved, the applicant will be advised by the Controller of Rubber when the worn tire should be sent to Melbourne for inspection by experts to ascertain whether it can be retreaded or remoulded. No new tires will be released unless, in the opinion of the experts in Melbourne, the worn ones are beyond repair.

(iii) *Retreads and Remoulds*: No permit is necessary for the remoulding or retreading of tractor tires, and farmers are strongly advised to use this service wherever possible as it will save much of their time and trouble and much of the country's rubber. The farmer should make his own arrangements with the remoulding firm.

N.B.—The Rubber Directorate advises that no tractor tires can be released to enable tractors to be converted from steel wheels to pneumatic tires during 1944.

Pumps.

Controlling Authority — Directorate of Materials Supply, 532 Bourke-street, Melbourne, C.1.

Applicant should lodge his order with the local merchant and apply, in writing, to the Controlling Directorate. This application should be certified as essential by the Local War Agricultural Committee.

SECTION 2.

(War Agricultural Committee Sponsorship Not Required.)

1. Axes:

Controlling Authority — Directorate of Machine Tools and Gauges, 501 Little Collins-street, Melbourne.

Applicants should lodge their orders on the Directorate's application form with the local merchant who will forward it to the Directorate of Machine Tools and Gauges. No sponsorship by the War Agricultural Committees is required, notwithstanding any other previously issued advice to the contrary.

2. Binder Twine:

Controlling Authority—The Controller of Cordage and Fibres, 485 Bourke-street, Melbourne.

Binder twine is available for use only in reaper-binders and for sowing bags of heavy vegetables. Farmers may obtain their normal seasonal requirements from their usual retailers without any permit or written application. However, should any dispute arise or a farmer require an abnormally large quantity an application must then be forwarded to the controller for authorization to supply.

3. Bore Casing and Boiler Tubes:

Controlling Authority — Directorate of Materials Supply, 532 Bourke-street, Melbourne.

Applicant lodges his order with the local merchant who forwards it to the wholesaler. Each order is referred to the Directorate of Materials Supply which authorizes delivery.

4. Chemicals:

(*a*) *Formalin.*—May be released for treatment of seed potatoes, fumigating cool stores and incubators, sterilization of seed bed soils, controlling weavil and mould in sheep skins, and for the control of footrot in sheep.

Applicants should place their orders with the local merchant and apply, in writing, to the Directorate of Materials Supply, 532 Bourke-street Melbourne. This application should state clearly the quantity required, the purpose for which it is required, the quantity used each month, or, where not applicable, the length of time that the quantity applied for will last, and the name and address of the supplier.

(*b*) *Nicotine Sulphate.*—Can only be released for use in vegetable dusts and stock drenches, and a limited quantity for the control of orchard pests.

Farmers do not require a permit to purchase made-up dusts and drenches containing nicotine sulphate.

However, farmers requiring nicotine sulphate for making their own dusts, drenches, and sprays, must apply on the appropriate form to the Director, Department of Agriculture, Melbourne, C.2. Applications for nicotine sulphate for orchard pest control should be submitted to the Orchard Supervisor for endorsement.

5. Electric Motors.

Controlling Authority — Directorate of Machine Tools and Gauges, 501 Little Collins-street, Melbourne.

Applications, on the appropriate form, should be sent direct to the Controlling Authority. The machine which the motor is required to drive should be clearly stated. Only single-phase motors up to and including 2 h.p. can be supplied. Three-phase motors of all sizes are available for essential use.

6. Fibrous Plaster

Controlling Authority—Department of War Organization of Industry, 187 Collins-street, Melbourne.

Applicant places his order with the local merchant. The order is then sent to the manufacturer concerned, who refers it to the Controlling Department for a permit to supply.

7. Fly Wire Mesh.

Controlling Authority — Directorate of Materials Supply, 532 Bourke-street, Melbourne.

Can be released only for the protection of foodstuffs in the interests of public health. Applications should be made to the Controlling Directorate, in writing, stating the minimum quantity required, the purpose for which it is required, and the retailer and wholesaler from whom it has been ordered. Applications for fly wire for use in dairies should be endorsed by the Dairy Supervisor.

8. Galvanized Iron.

Controlling Authority — Directorate of Materials Supply, 532 Bourke-street, Melbourne.

Can be made available only for conservation of household drinking water. Applicant should place his order with the local merchant on a G.I. form, stating clearly the purpose for which the iron is required. This form is then forwarded to the wholesaler, who refers it to the Directorate of Materials Supply for

release. This material will not be released for covering walls of buildings or for roofing where such is not used as a catchment for household drinking water.

9. Heating Appliances.

(*a*) *Dairy Water Heaters.*—Applicant completes an Agricultural Machinery Application Form A and lodges it with his local agent, who may supply immediately if essential.

(*b*) *Domestic Heating Appliances.*—One-fire cooking stoves not under control. All other heating appliances under control of the Department of War Organization of Industry. Applications on the appropriate form, together with the local merchant's certification that he can supply the appliance mentioned, should be forwarded direct to the above Department.

10. New Motor Trucks.

Controlling Authority — Directorate of Emergency Road Transport, 188 King-street, Melbourne.

Applications on special form, available from distributors, should be lodged with the Local Transport Advisory Committee. A written permit to purchase will be issued if the application is approved.

11. Nails, Screws, Nuts, and Bolts.

Controlling Authority — Directorate of Materials Supply, 532 Bourke-street, Melbourne.

Applicant lodges his order with the local merchant and forwards a written application to the Directorate giving full details of his order together with a statement of the purposes for which required.

12. Petrol.

Applications should be made direct to the Local Transport Advisory Committee in the shire concerned.

13. Potato Forks.

Distribution to merchants in potato-growing districts is controlled by the Deputy Potato Controller, 374 Little Collins-street, Melbourne.

Farmers should lodge their orders with the local merchant in the usual way. Forks will be allotted to the merchants according to the number ordered by them from the wholesalers.

14. Ridging, Spouting, and Downpiping.—See Galvanized Iron.

15. Rubber Boots.

Controlling Authority—The Controller of Rubber, 485 Bourke-street, Melbourne.

Applications should be made on the appropriate form embodying the required statutory declaration. This is then lodged with the local merchant who forwards it to the manufacturer stipulated for supply. Should one manufacturer be unable to supply the particular size asked for, the local merchant is advised to make inquiries and place his order with a manufacturer who can supply boots of the required size.

16. Rubber Hose Piping.

Controlling Authority—The Controller of Rubber, 485 Bourke-street, Melbourne.

Applicants requiring ½-in., ¾-in., and 1-in. rubber hose piping should complete the appropriate form, No. 31, and sign the statutory declaration thereon. The form is lodged with the local retailer who will forward it to the manufacturer concerned. Applications not exceeding 120 feet of hosing for commercial vegetable growing; 60 feet for other agricultural or industrial purposes; or 30 feet for the home growing of vegetables, may be supplied without reference to the Controller. Applications for quantities in excess of these must be referred to the Controller, and applicants are advised to furnish a covering letter stating why the extra quantity is required.

17. Spare Parts.

(*a*) *Automotive.*

Controlling Authority—Controller of Automotive Spare Parts, 485 Bourke-street, Melbourne.

Applications, on the appropriate form (No. 100), should be lodged with the local dealer, who will supply the part immediately if liquid fuel priority rating is high enough. If not, the form will be referred to the Controller for authority to supply.

(*b*) *Tractor and Stationary Engine.*

Parts not included in list of controlled automotive spare parts are not under any control. Applications for controlled parts for use in tractors and stationary engines shall be made on Form 100, as above, and the form endorsed to the effect that the parts applied for will not be used in a car or truck. Spare parts for this purpose may be supplied immediately without reference to the Controller.

18. Superphosphate and Other Fertilizers.

Applications, giving full details of the use to which the fertilizer will be put, should be forwarded direct to The Officer in Charge, Fertilizer Rationing Section, Department of Agriculture, Melbourne.

19. Timber Supplies.

Controlling Authority—Deputy Timber Controller, 475 Collins-street, Melbourne.

Farmers should make their own arrangements with the local timber merchants wherever possible. If the local merchant is unable to supply the timber required, an application on a T.C.5 form, giving full particulars of the purposes for which the timber is required should be forwarded to the Deputy Timber Controller.

20. Tires—Car and Truck.—New, Second-hand, Retreading or Recapping.

Controlling Authority—The Controller of Rubber.

Application on the appropriate form should be lodged with the Local Transport Advisory Committee in the shire concerned.

21. Water Piping.

Controlling Authority — Directorate of Materials Supply.

Applications on P.I. form, should be lodged with the local merchant who will forward the completed form to his wholesaler. Each order is then referred to the Directorate of Materials Supply which authorizes delivery.

Tubercle-free Herds

ACCREDITED TUBERCLE-FREE HERDS.

The following herds have been declared free of tuberculosis under the *Accredited Tubercle-free Herd Scheme* conducted by the Department of Agriculture. Under this scheme a tubercle-free accredited herd of cattle is one in which the entire herd has passed two negative, successive, annual physical examinations and tuberculin tests, or upon disclosure of infection, three semi-annual, successive physical examinations and tuberculin tests applied by a State Veterinarian or by a qualified and registered veterinarian who is approved by the Chief Veterinary Inspector for that purpose.

Name.	Address.	Number in Herd.
Armstrong and Son	Wangaratta	105
Ballarat Orphanage	Ballarat	105
Banyule Stud Pty. Ltd.	Wangaratta	54
Black, I. S., Estate	Mount Noorat	53
Cribbes, T.	Wangaratta	39
Deering, J. T.	South Wangaratta	61
Dennis, Mrs. A. A.	Frankston	42
Dookie Agricultural College	Dookie	85
Dunbar and Clark, Messrs.	"Hazeldean Dairy," Mount Dandenong	18
Geelong Grammar School	Corio	78
Gibson, Mrs. C. S.	"Sweeney's," Eltham	35
Gorman, A. W.	"Cathcart," Alexandra	57
Griffin, G. W.	Gladysdale	49
Griffiths, J. G.	Benalla	121
Henry, J. A.	Warrnambool	41
Howlett, Mrs. G. and Miss E. Samuel	Lang Lang	55
Jahobi, L. W.	"Granada," Yannathan	80
Kane, F. E.	Warrnambool	28
Kilmany Park Farm Home for Boys	Sale	105
Lady Talbot Milk Supply Co.	Cranbourne	479
Lawrence, P. H.	"Rainga," Tarrawarra	83
Longerenong Agricultural College	Dooen	48
Maloney, P. J.	Tongala	66
McNabb and Son, G. A.	Irrewillipe East	154
Nancarrow Bros.	Kerang	52
Noonan, G.	Benalla	32
Noonan, Mrs. S. A.	Benalla	35
Northcote Children's Farm	Bacchus Marsh	164
Onley, W. H.	"Glenholme," Caldermeade	65
Parker, Mrs. L. M.	Tallarook	56
Payne, A. E. T.	"Yarra View," Lilydale	66
Payne, T. E. N.	"Woodburn," Kilmore	44
Poole, M. A. and D.	Caldermeade	150
Poole, M. A. and D.	Yannathan	79
Powell, T. S.	"Carellen," Mansfield	43
Richardson, Bros., Messrs.	"Faldinghurst," Upper Beaconsfield	30
School of Horticulture	Burnley	6
State Experiment Farm	Rutherglen	37
State Research Farm	Werribee	245
Stephens, Dr. F.	Vermont	32
Vagg, T. R.	Officedale	45
Wells, W. G.	Caldermeade	65

In addition to the above herds, there are 1,494 head of cattle on 270 properties supplying milk to Benalla, Wangaratta, Rutherglen, and Yea, that have passed two successive negative tests.

There are also 421 herds in which 11,360 head of cattle have passed one test, and may be considered, therefore, to be in process of becoming tubercle-free herds.

eight-year average of 606 lb. butterfat, and appears third among all cows on the Advanced Register of Merit.

Mr. G. S. Daley's "Karrara Fancy Madeira," 650·4 lb. butterfat, is also a daughter of a great test cow; for her dam "Werribee Fancy Madeira," was champion test cow in 1933. "Yarraview Alys," 639·2 lb. butterfat, is a worthy representative of last year's champion herd. This cow has an advanced register ranking of 490 lb. butterfat for five years, while her dam, "Rose Gem of Maple Lodge," has produced up to 763 lb. butterfat.

"Mornmoot Princess Madeira 17th" (R. M. Chirnside), yielded 634 lb. butterfat as a Senior three-year-old.

The Senior four-year-old class is an unusual one, most of the positions being filled by cows from the lesser-known breeders, while only 40 lb. butterfat divides all six cows. W. J. Carne's "Wonga Park Songbird" leads with 533 lb. butterfat. Messrs. Nancarrow Bros. "Pine Ridge Rose Dream 3rd," S. H. Masters and Son's "Rutland Brunette 22nd," R. H. Bennett's "Edenhope Queen's Maid," and P. W. Clark and Son's "Coodardy Jannette," all have yields very close to one another.

The Junior four-year-old section is most interesting. All six cows have higher yields than five of the senior four-year-olds. "Belgonia Junette 7th" (596·2 lb.) and "Junette 15th" (495·1 lb.), also "Belgonia Suspense 12th" (551·6 lb. butterfat), are leaders in the Junior four, Junior two, and Senior two classes respectively. A maternal half-sister to "Junette 7th" appears in fourth place in the Junior three class. She is "Junette 13th," her yield being 514·3 lb., while "Peggy 26th," with a record of 518·8 lb. butterfat, is third in the Senior three class. These daughters of "Aim High" and "Baron Design," two imported bulls, have materially assisted the "Belgonia" herd to the prominent position that it holds in this report. "Junette 13th" and "Junette 15th" are daughters of "Belgonia Junette 5th," a top-ranking Advanced Register cow, her average butterfat yield being 571 lb. for six years.

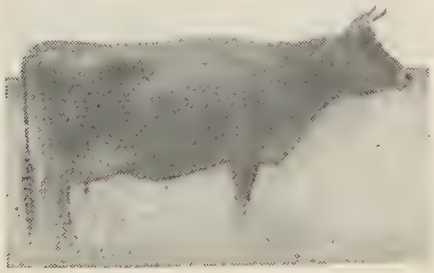
"Jindivick Heroine 16th," owned by O. Ronalds and Son, occupies second place on the Junior four list, with the excellent yield of 571·8 lb. butterfat. Her dam, "Jindivick Heroine 8th," has a six-year average of more than 500 lb. butterfat. This excellent performance places her high on the Advanced Register of Merit. Her dam, in turn, viz., "Jindivick Heroine 5th," produced 631 lb. butterfat as a Junior four-year-old. "Somerville Master Babs," the sire of "Heroine 8th," is a son of "Babs of Somerville," whose record of 843 lb. butterfat in 1925 captured the Senior four year-old Jersey record of the British Empire.

"Elm Grove Orchid 2nd" has the unusual distinction of appearing in two sections. Her 525·8 lb. Junior three-year-old yield was followed by one of 538·5 lb. in the Junior four class. She is the youngest daughter of the seventeen-year-old bull, "Goldstar of Melrose," who sired so many good producers in the "Elm Grove" Stud of R. G. Gay and Son.

"Bamawm Daisy Bell 2nd," owned by the estate of the late F. A. Williams, also appears in two sections, with yields of 514·2 and 516·4 butterfat as a Junior three and Senior three-year-old respectively. Her sire is a grandson of the famous test cow "Ballara Bonnie," whose ten-year average yield of 569 lb. butterfat places her high among the great lifetime producers of Australia.

Mr. R. H. Mitchell's "Clifford Farm Winsome" has a 527·4 record as a Junior four; while "Clifford Farm Lotus" leads the Junior three class with a 538·5 lb. butterfat yield. In fifth place among the Junior two-year-olds is "Clifford Farm Sandra," with a 448·1 lb.

butterfat yield. "Lotus" is a daughter of "Clifford Farm Norma," an Advanced Register cow; while "Sandra" is a maternal grand-daughter of "Gladsome," the dam of this year's Reserve Champion, whose yields are referred to elsewhere in this report.



The Mature Jersey cow "Avon Jasmine" (Estate W. H. Lyon), produced 710 lb. butterfat.

Mr. W. J. Wade's "Inverbroom Air Marie," third in the Junior three class with 525·1 lb. butterfat, is a daughter of "Inverbroom Silvermine's Marie," an Advanced Register cow, with an eight years' unfinished lifetime average yield of 461 lb. butterfat.

No fewer than five representatives of Mr. H. Jackson's "Lockington" herd appear in this year's classes. The 619·1 lb. yield of "Pine Ridge Countess 3rd" places her among the over 600 lb. producers of the year. "Milvue Aim's Coronation," 527·7 lb., and "Lockington Starette's Gem," 510·2 lb. butterfat, are third and fifth among the Senior two-year-olds; while second and fifth places on the Junior two class are occupied by "Surrey Bonnie Madeira 12th" and "Surrey Buttercup 17th," with 455·9 and 448·1 lb. butterfat yields. These excellent performances suggest that this herd will occupy a more prominent position in future reports of the Standard Test.

"Windrest Rosebay's Dainty" and "Island Star 2nd" occupy sixth place respectively in each class.

The "Devon Park" Stud Farm has two worthy representatives in "Karrara Perree's Music" (505·3 lb. butterfat in the Senior four class), and "Karrara Duke's Eileen," a 516·4 lb. Senior two-year-old.

Mr. J. A. Huffer's "Glen Valley Iris," 516 lb. butterfat, in the Senior three class, and Mr. J. J. Desmond's Junior two-year-old "Macroom Mary 3rd," 452·2 lb. butterfat, add to the number of excellent Jersey performances; while "Meadow Vale Thora" (542·7 lb. butterfat), owned by Messrs. Teychenne and Ducret, is an unusual Senior two-year-old Guernsey.

Unfortunately, the limited number of daughters tested from any one dam make it impossible to provide a thorough survey of her transmitting ability. A regrettable feature of the Standard Herd Test is that this is also true of the great majority of sires used; and it is for this reason that sire survey work must depend largely on the commercial dairy herds for any real development.

The Standard Herd Test Records for the quarter ended 30th June, 1944, will be included in the Standard Herd Test booklet to be published towards the end of September. Copies of this booklet may be obtained after 1st October from the Superintendent of Dairying, Department of Agriculture, Melbourne, C.2.

Cows Exceeding 500 lb. Butterfat.

Class.	900 to 1000 lb.	800 to 900 lb.	700 to 800 lb.	600 to 700 lb.	500 to 600 lb.	Total.
Mature ..	1	1	1	4	42	49
Senior 4 ..	..	..	..	..	5	5
Junior 4 ..	..	..	..	..	10	10
Senior 3 ..	..	..	..	1	5	6
Junior 3 ..	..	..	..	..	10	10
Senior 2 ..	..	..	..	..	5	5
Junior 2 ..	..	..	..	..	..	..
Total ..	1	1	1	5	77	85*

* Grand Total.

Averages—1943-1944.—273 Days' Lactation Period.

Class.	Number of Records.	Average Butterfat without Allowances.	Average Butterfat with Allowances.
		lb.	lb.
Mature	676	373	..
Senior 4-year-old ..	148	347	367
Junior 4-year-old ..	178	344	384
Senior 3-year-old ..	189	342	402
Junior 3-year-old ..	257	319	399
Senior 2-year-old ..	217	315	415
Junior 2-year-old ..	508	273	393
Total ..	2,173	..	..

Average all Classes without Allowances 331 lb butterfat.
Average all Classes with Allowances 388 lb butterfat.

The Six Leading Cows in Each Section.

Owner.	Name of Cow.	Class.	Breed.	Butterfat.
				lb.
Payne, A. E. T.	Yarraview Le Mode	Mature	Guernsey	975·8
Eltringham, W. B.	Clifford Farm Pussy Willow	,,	Jersey	838·4
Lyon, W. H. (deceased)	Avon Jasimine	,,	,,	709·9
Chirnside, R. M.	Mornmoot Princess Madeira 9th	,,	,,	652·1
Devon Park Stud Farm, G. S. Daley	Karrara Fancy Madeira	,,	,,	650·4
Payne, A. E. T.	Yarraview Alys	,,	Guernsey	639·2
Carne, W. J.	Wonga Park Songbird	Senior 4	Jersey	533·0
Nancarrow Bros.	Pine Ridge Rose Dream 3rd	,,	,,	519·2
Masters, S. H. and Son	Rutland Brunette 22nd	,,	,,	515·2
Bennett, R. H.	Edenhope Queen's Maid	,,	,,	507·2
Devon Park Stud Farm, G. S. Daley	Karrara Perree's Music	,,	,,	505·3
Clark, P. W. and Son	Coodardy Jannette	,,	,,	493·5
Maloney, P. J.	Belgonia Junette 7th	Junior 4	Jersey	596·2
Ronalds, O. and Son	Jindivick Heroine 16th	,,	,,	571·8
Chirnside, R. M.	Mornmoot Princess Madeira 20th	,,	,,	552·9
Gay, R. G. and Son	Elm Grove Orchid 2nd	,,	,,	538·5
Mitchell, R. H.	Clifford Farm Winsome	,,	,,	527·4
Chirnside, R. M.	Mornmoot Mimi 4th	,,	,,	524·2
Chirnside, R. M.	Mornmoot Princess Madeira 17th	Senior 3	Jersey	633·5
Chirnside, R. M.	Mornmoot Fancy Starbright 6th	,,	,,	541·5
Maloney, P. J.	Belgonia Peggy 26th	,,	,,	518·8
Williams, Estate late F.A.	Bamawm Daisy Bell 2nd	,,	,,	516·4
Huffer, J. A.	Glen Valley Iris	,,	,,	516·0
Lyon, W. H. (deceased)	Avon Nemesia 2nd	,,	,,	502·5
Mitchell, R. H.	Clifford Farm Lotus	Junior 3	Jersey	538·5
Gay, R. G. and Son	Elm Grove Orchid 2nd	,,	,,	525·8
Wade, W. J.	Inverbroom Air Marie	,,	,,	525·1
Maloney, P. J.	Belgonia Junette 13th	,,	,,	514·3
Williams, Estate late F. A.	Bamawm Daisy Bell 2nd	,,	,,	514·2
Chirnside, R. M.	Werribee Twilight 3rd	,,	,,	511·8
Maloney, P. J.	Belgonia Suspense 12th	Senior 2	Jersey	551·6
Teychenne and Ducret	Meadow Vale Thora	,,	Guernsey	542·7
Jackson, H.	Milvue Aim's Coronation	,,	Jersey	527·7
Devon Park Stud Farm, G. S. Daley	Karrara Duke's Eileen	,,	,,	516·4
Jackson, H.	Lockington Starette's Gem	,,	,,	510·2
Haywood, Dr. A. R.	Windrest Rosebay's Dainty	,,	,,	490·8
Maloney, P. J.	Belgonia Junette 15th	Junior 2	Jersey	495·1
Jackson, H.	Surrey Bonnie Madeira 12th	,,	,,	455·9
Desmond, J. J.	Macroom Mary 3rd	,,	,,	452·2
Jackson, H.	Surrey Buttercup 17th	,,	,,	448·2
Mitchell, R. H.	Clifford Farm Sandra	,,	,,	448·1
Haywood, Dr. A. R.	Windrest Island Star 2nd	,,	,,	440·6

List of Cows, 600 lb. Butterfat or Over.

Owner.	Name of Cow.	Class.	Breed.	Butterfat.
				lb.
Payne, A. E. T.*	Yarraview Le Mode	Mature ..	Guernsey ..	975·8
Eltringham, W. B.	Clifford Farm Pussy Willow	,, ..	Jersey ..	838·4
Lyon, W. H. (deceased) ..	Avon Jasmine	,, ..	,, ..	709·9
Chirnside, R. M.	Mornmoot Princess Madeira 9th ..	,, ..	,, ..	652·1
Devon Park Stud Farm, (G. S. Daley)	Karrara Fancy Madeira	,, ..	,, ..	650·4
Payne, A. E. T.	Yarraview Alys	,, ..	Guernsey ..	639·2
Chirnside, R. M.	Mornmoot Princess Madeira 17th ..	Senior 3 ..	Jersey ..	633·5
Jackson, H.	Pine Ridge Countess 3rd	Mature ..	,, ..	619·1

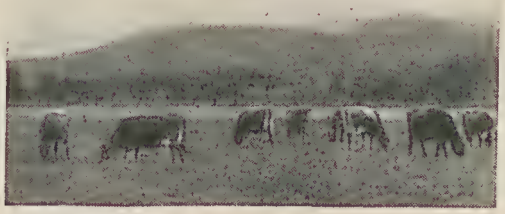
* Milked thrice daily.

HERD AVERAGES, 1943-44

Owner.	Breed.	Junior 2-year-old.		Senior 2-year-old.		Junior 3-year-old.		Senior 3-year-old.		Junior 4-year-old.		Senior 4-year-old.		Mature.		Total Herd.	Average without Allowances.	Average with Allowances.
		No.	Average.	No.	Average.	No.	Average.	No.	Average.	No.	Average.	No.	Average.	No.	Average.	No.		
			lb.		lb.		lb.		lb.		lb.		lb.		lb.		lb.	lb.
Herds of 25 Cows and Over.																		
1 Chirnside, R. M.	Jersey ..	13	353·3	2	393·3	3	481·4	2	587·5	4	519·0	..	..	3	527·9	27	431·8	522·2
2. Maloney, P. J.	,, ..	8	402·5	5	445·0	4	485·6	2	477·7	1	596·2	..	..	9	450·9	29	448·2	522·1
3. Devon Park Stud Farm (G. S. Daley)	,, ..	6	325·0	6	384·1	8	349·7	1	471·4	1	273·3	2	409·7	7	427·2	31	374·4	450·2
4 Haywood, Dr. A. R.	,, ..	11	305·6	3	413·5	1	380·1	4	425·0	4	364·3	2	369·7	14	429·3	39	381·8	448·7
5. Bennett, J. W.	,, ..	14	337 1	4	333·4	5	384·6	1	342·2	4	334·6	5	383·4	9	415·8	42	364·7	444·8
6. Hore, E. ..	,, ..	9	294·3	4	358·5	12	353·6	..	..	5	380·4	1	470·4	3	476·2	34	356·7	444·4
7. Williams. Estate the late F. A.	,, ..	5	291·8	1	420·4	4	378·7	2	428·6	..	..	2	382·0	11	434·4	25	391·7	443·9
8. Clarke, F. W. ..	,, ..	2	288·4	5	317·9	3	434·6	5	376·4	4	380·2	2	461·9	9	383·9	30	375·0	431·9
9. Waterhouse, H. W., and Son	,, ..	6	264·2	5	337·1	..	..	..	..	1	396·4	2	386·2	12	432·9	26	370·6	426·1
10. Fairchild and Clutterbuck	,, ..	8	294·1	1	368·5	3	442·3	4	369·8	2	412·0	2	362·2	9	377·6	29	361·2	425·4
11. Harvey, T. ..	,, ..	7	315·3	..	..	4	326·1	6	340·2	3	389·6	1	354·7	10	412·4	31	361·3	422·8
12. Department of Agriculture	Red Poll	14	323·9	3	319·9	6	311·3	12	354·3	1	285·6	6	311·8	14	377·2	56	340·2	420·3
13. McNabb, G. A., and Son	Jersey ..	19	237·5	7	293·2	13	313·5	6	339·4	4	327·1	7	368·7	10	412·9	66	313·6	410·0
14. Atkinson, W. K.	Dairy Shorthorn	11	261·4	..	..	6	299·4	2	335·2	11	359·8	1	239·6	20	397·1	51	342·8	407·4
15. Read, Estate of the late J. D.	Jersey ..	8	262·4	3	333·6	4	314·9	3	365·7	3	280·2	1	206·5	10	368·6	32	318·4	386·3
16. Maher, R. H. ..	,, ..	5	251·2	..	..	1	273·9	6	324·3	3	400·6	1	474·4	12	353·2	28	335·4	384·0
17. Bott, J. ..	Red Poll	9	260·7	8	304·2	1	290·7	1	359·3	..	..	..	..	6	331·9	25	296·9	382·7
18. Walker, C. S. ..	Jersey ..	14	265·2	..	..	4	295·0	1	326·3	8	355·2	3	248·2	13	352·6	43	311·4	382·1
19. Tomasetti, B. G.	Ayrshire	12	272·9	1	270·0	4	300·8	2	283·3	1	441·0	1	324·1	12	342·0	33	308·6	379·4
20. McKenzie, Mrs. E. J., and Sons	Jersey ..	6	279·4	2	276·1	2	284·5	1	219·4	4	352·9	3	283·4	7	341·9	25	306·9	366·3
21. Whelpton, B. ..	,, ..	4	257·6	7	265·7	5	296·4	2	364·8	..	..	4	348·9	9	300·6	31	296·9	362·3
22. Ballarat Orphanage	,, ..	9	272·2	4	311·2	5	272·8	3	334·7	2	320·1	3	304·3	12	285·9	38	290·7	360·1
23. Parker, L. M. ..	Dairy Shorthorn	5	224·7	4	228·1	1	301·3	4	352·8	1	355·3	3	368·8	12	310·4	30	297·8	352·6

Herd Averages, 1943-44—*continued.*

Owner.	Breed.	Junior 2-year-old.		Senior 2-year-old.		Junior 3-year-old.		Senior 3-year-old.		Junior 4-year-old.		Senior 4-year-old.		Mature.		Total Herd.	Average without Allowances.	Average with Allowances.
		No.	Average.	No.	Average.	No.	Average.	No.	Average.	No.	Average.	No.	Average.	No.	Average.	No.		
			lb.		lb.		lb.		lb.		lb.		lb.		lb.		lb.	lb
Herds of 15 to 24 Cows.																		
1. Payne, A. E. T.	Guernsey	6	354·2	2	329·5	..	..	4	361·2	..	..	1	483·4	10	558·1	23	447·5	502·3
2. Masters, S. H., and Son	Jersey ..	2	358·4	2	350·8	3	416·3	..	..	3	478·7	1	515·2	5	482·8	16	439·5	491·3
3. Mitchell, R. H.	,, ..	3	387·8	..	..	3	445·6	1	459·2	2	522·7	3	400·7	4	456·6	16	439·6	496·1
4. Clark, P. W., and Son	,, ..	3	335·6	3	393·7	3	463·5	1	446·1	2	369·4	3	420·9	9	414·9	24	406·7	457·0
5. O'Neill, J. ..	,, ..	4	347·8	4	389·1	3	381·7	..	..	..	..	..	..	5	415·8	16	385·7	456·2
6. Dennis, Mrs. A. A.	,, ..	2	395·7	5	392·9	1	416·4	..	..	1	316·2	..	..	6	413·9	15	397·7	455·6
7. Gay, R. G., and Son	,, ..	3	320·8	5	348·1	3	396·4	1	438·3	2	450·0	1	400·1	6	420·4	21	388·2	451·2
8. Phillips, J. H.	,, ..	11	320·4	..	..	1	231·5	3	388·5	..	..	..	..	7	455·8	22	368·7	444·1
9. Huffer, J. A. ..	,, ..	2	300·9	2	391·8	3	329·8	5	411·5	1	358·9	1	413·1	5	424·3	19	385·6	442·3
10. Department of Agriculture	Friesian	5	333·7	2	331·7	4	359·3	..	..	..	..	1	412·5	7	414·6	19	372·9	434·9
11. Nicholas, M. A.	Jersey ..	4	332·5	..	..	2	292·4	1	461·1	2	479·3	2	431·1	10	381·8	21	381·7	423·7
12. Colenso, L. W.	,, ..	4	232·0	2	290·6	2	363·6	4	375·2	..	..	1	300·2	10	444·2	23	368·7	420·5
13. Nancarrow Bros.	,, ..	2	307·5	2	352·3	1	205·9	2	427·2	..	..	2	474·4	6	380·4	15	374·1	419·4
14. Bennett, R. H.	,, ..	4	224·9	3	304·6	..	..	1	255·1	1	418·8	5	420·4	9	414·3	23	372·1	418·7
15. Handbury, J. E., and Son	,, ..	5	258·6	2	371·4	5	328·6	4	357·2	2	314·3	..	..	4	445·0	22	341·7	414·3
16. Broad, Mrs. A. A.	,, ..	7	293·4	1	347·3	1	391·5	1	367·1	1	375·6	1	365·2	5	384·2	17	342·4	410·5
17. Lyon, Estate of the late W. H.	,, ..	6	188·6	2	277·9	3	371·4	3	444·0	1	341·3	1	403·4	5	452·7	21	340·1	409·8
18. Meaklim Bros.	Dairy Shorthorn	4	272·0	..	..	1	306·6	3	316·2	3	386·9	2	428·6	6	385·8	19	351·4	400·7
19. Smith, R. W., and Son	Friesian	5	278·6	2	354·2	2	272·2	..	..	2	368·1	2	325·1	7	388·3	20	337·5	394·0
20. Hardie, R. B. ..	Jersey ..	5	285·0	2	256·5	2	370·9	1	376·8	..	..	3	347·2	2	343·5	15	320·2	392·2
21. Butcher, F. T.	Red Poll	3	261·2	2	358·8	3	360·0	1	344·7	3	304·8	2	318·6	5	377·7	19	335·0	390·7
22. Hore, M. T. ..	Friesian	10	263·9	..	..	1	308·1	3	337·7	..	..	1	473·6	5	363·5	20	312·6	389·1
23. Langlands, F. B.	Jersey ..	1	257·7	2	335·8	4	318·2	1	291·5	3	404·4	..	..	7	331·8	18	335·0	382·0
24. Wade, W. J. ..	,, ..	3	268·5	..	..	1	525·1	3	333·2	..	..	..	..	11	354·3	18	346·0	381·9
25. Macauley, C. W.	,, ..	6	217·6	3	304·3	3	367·3	..	..	2	314·2	1	248·7	3	309·6	18	284·8	361·8
26. Hurrey, Estate of the late W. H.	,, ..	1	286·2	4	301·2	1	329·0	1	260·2	1	273·6	2	322·6	12	341·7	22	322·7	359·8
27. Broad, A. J. ..	,, ..	6	251·5	..	..	2	312·3	2	326·9	..	..	1	446·6	5	289·4	16	292·6	356·8
28. Hartley, C. G.	,, ..	6	198·4	3	297·2	3	304·4	3	308·1	2	306·2	1	319·1	5	330·1	23	282·7	353·7
Herds of 10 to 14 Cows.																		
1. Jackson, H. ..	Jersey ..	5	357·8	2	518·9	1	510·1	1	373·5	..	..	..	..	3	550·3	12	446·8	525·1
2. Desmond, J. J.	,, ..	1	452·2	1	288·2	2	323·2	2	393·1	2	371·6	2	467·5	3	471·8	13	405·1	452·8
3. Powell, T. S ..	,, ..	2	254·8	..	..	2	350·5	1	442·4	1	426·5	2	411·5	5	416·4	13	383·4	425·0
4. Tait, W. G. ..	,, ..	7	303·8	1	354·2	..	..	..	..	1	381·1	1	305·9	..	..	10	316·8	416·8
5. Banyule Pty. Ltd.	,, ..	3	356·9	3	270·3	2	319·2	1	319·2	..	..	1	430·5	3	410·2	13	346·2	415·4
6. Keele, H. A. ..	,, ..	4	308·6	..	..	1	359·3	3	318·0	1	355·6	..	..	2	414·9	11	339·5	410·4
7. Cowan G. L. S.	Friesian	2	231·7	2	316·8	1	332·6	3	335·6	..	..	2	391·6	4	419·0	14	349·7	402·6
8. Hicks, E. J. ..	Jersey ..	2	288·7	2	305·0	2	306·6	2	355·9	1	346·6	2	348·5	3	399·1	14	339·6	396·7
9. Trevaskis, F. T.	,, ..	4	293·4	1	247·6	..	..	2	334·0	1	472·9	..	..	5	363·7	13	337·0	393·9
10. Vaughan Bros.	,, ..	4	250·4	3	395·2	2	335·3	1	391·6	..	..	..	..	4	282·2	14	312·7	384·2
11. Dunmore, T. J.	,, ..	6	263·5	..	..	1	334·2	..	..	..	..	3	329·0	2	336·6	12	297·9	369·6
12. Pattison, G. ..	Ayrshire	1	279·9	2	270·6	3	275·4	1	310·4	..	..	1	269·7	2	400·2	10	302·8	366·8
13. Andrew, W. ..	,,	6	237·8	1	347·3	..	..	1	307·1	..	..	1	224·6	2	382·7	11	279·2	361·0
14. Tyssen, C. J. ..	Jersey ..	1	209.3	1	369.9	1	257.4	..	..	1	420.1	1	249.7	8	348.6	13	330.4	358.1
15. Woodyer, P. A.	,, ..	3	272.5	..	..	1	262.1	1	238.5	3	330.1	1	323.5	1	286.2	10	291.8	355.8



IN THE ORCHARD

Contributed by the Horticultural Division

Propagation of Citrus Trees

AT the present time many citrus growers wishing to extend plantings and develop new areas are finding some difficulty in securing supplies of trees because of man-power restrictions in nurseries normally propagating citrus. Undoubtedly, the propagation of trees is a specialized job and it is in the best interests of the fruit industry that this important work should be left in the hands of nurserymen with long years of experience. However, because of the present shortage, it may be the desire of some growers to produce their own trees, and it is for this reason that the following notes are supplied.

Seeds.

It is first necessary to secure a supply of seeds for rootstocks. Seeds most commonly used at the present time are obtained from the sour or Seville orange, common orange, rough lemon, and *Poncirus trifoliata*. The suitability of these seeds for rootstocks varies according to the conditions under which the trees will be grown. It is not intended to discuss in detail here the relative merits of these various seedlings. Rough lemon stocks produce quickly-growing trees which are more susceptible to root rot than either the sweet or sour orange. *Trifoliata* has a dwarfing effect on most citrus varieties but is highly resistant to root rot. For general purposes the sweet or sour orange seedlings are most favoured as rootstocks.

Seed from the desired variety may be obtained from the fruit by squeezing through a seive and washing the seeds free from pulp. An alternative method is to pulp the fruit in barrels and allow the mass to ferment, after which the seed may be extracted by washing through a sieve. After the seed has been washed, it should be quickly dried and placed about an inch deep in boxes of moist, clean, washed sand. Seed allowed to remain dry for any lengthy period will not germinate satisfactorily. The boxes containing seed should be kept moist until September, when the seed may be recovered from the sand by sieving.

The seed bed should be chosen in a situation sheltered from hot winds. In hot districts, the erection of a half shade lath shelter may be necessary. Soil should be well prepared and tile drained, if necessary. The seed should be planted 1 inch deep and 3 inches apart in drills 9 inches apart. During the first season's growth the young plants will require adequate water, and cultivation between rows is necessary for weed control.

Seedlings.

The seedlings may be allowed to remain in the seed bed for one season's growth, after which they should be transplanted to nursery rows in the following September or October. Prior to planting out, the nursery should be well cultivated and manured by working into the soil a dressing of farmyard manure. Growing a green manure crop of peas or tick beans and ploughing down in August would be beneficial.

In removing seedlings the top few inches of growth should be trimmed off and the tap

Well-grown orange trees in a nursery row. The growth from the bud has been tied to a stake to prevent it breaking in the wind.

root and any other large or broken roots should be cut back. Weak plants or those with bent roots should be rejected. The seedlings may then be planted 15 inches apart in rows 4 feet apart (8,712 trees per acre). If the soil is dry, each seedling should be watered when planted. During the months of October or November a dressing of sulphate of ammonia or nitrate of soda at the rate of 5 cwt. per acre (approximately 2 oz. per square yard) will result in strong growth. Adequate water should be made available by sprinkler or furrow irrigation systems during the summer. A windbreak located on the northern and western boundaries will protect the young plants from hot winds.

Budding.

A further season's growth in the nursery is required, after which the seedlings should be ready for budding. For successful budding it is desirable that the seedling should be half an inch or over in diameter. The best months for budding are November, December, and January. An illustrated description of the budding operation is presented in the bulletin, "Budding and Grafting of Fruit Trees," published by the Department. The bulletin is available for 1s., post free on application to the Director, Department of Agriculture, Melbourne, C.2.

In selecting buds for the trees, it is important that the budwood should be obtained from mature, vigorous trees which bear regular crops of "true-to-type" fruit. The buds should be inserted in the stock of 6 to 8 inches above soil level. Prior to the budding operation, the seedlings should be well watered in order to make the bark easy to lift. After the buds have "taken" and shown signs of commencing growth, the stock may be cut back to within 6 inches of the bud. The new growth, when 6 to 8 inches long, may then be supported by tying to the stub. The stub should be removed by a sloping cut as near as possible to the stem when about 18 inches of growth is made. All growth below the bud and side branches above the bud should be removed. When about 36 inches of new growth is made, the tree should be headed back to within 30 inches of ground level in order to develop scaffold branches. The trees will then be ready for transplanting to their permanent positions.

Planting Citrus Trees

The best time for planting of citrus trees is generally considered to be during September. Planted at this time of the year, young growth should commence immediately and would be less likely to suffer damage from the relatively infrequent frosts which occur. The land for planting should be well prepared by ploughing and disc cultivation. For the home gardener, the site in which the tree will be planted should be dug over, and if there is some doubt concerning the drainage of the ground, tile drains laid in the vicinity would be an advantage.

Trees obtained in commercial quantities are usually supplied bare rooted. If the roots have been puddled in clay prior to consignment they should be washed, and any broken ends of roots trimmed cleanly with a pair of sharp secateurs. Clean cuts callus readily and provide a better starting point for new rootlets than do broken ends. The tops should be cut back severely.

Home gardeners usually obtain "ball-rooted" trees, i.e. when dug in the nursery, the earth around the roots is disturbed as little as possible and kept in position with hessian. In planting such trees, a hole big enough to accommodate the ball is required. Before placing the tree in position there is no need to remove the hessian which quickly rots. The twine, however, should be loosened and removed.

The hole dug for bare rooted trees should be large enough to contain the roots without twisting them. In commercial planting, one person should hold the tree upright in position while another returns the soil to the hole. Shake the tree gently up and down in the hole to make sure that the soil falls closely around the roots. The soil should be pressed firmly around the roots, but should not be packed too tightly, particularly where it is of heavy texture. The trees should be set higher than when they were in the nursery. The final operation consists of a thorough watering of each individual tree, and during the summer, further waterings should be given as required.

Unless the soil is very poor, fertilizers should not be required at planting. The best manurial treatment is to incorporate farmyard manure with the soil before ploughing and apply a light dressing (2 cwt. per acre) of sulphate of ammonia or nitrate of soda during November or December.

IN THE GARDEN

By J. L. PROVAN, B.Agr.Sc., Principal, School of Horticulture, Burnley Gardens

Planting of Gladiolus

PLANTING of gladiolus corms can continue during September. Corms planted this month will flower in December and January, during the hot period of the year. The blooms produced in midsummer are usually not as good as those produced in the autumn, and it is advisable therefore, if any corms are planted now to place them in positions where they will be sheltered from the hot sun and drying winds. Planting can continue until January, and provided the corms can be held in a fairly dormant state, later planting is preferable to early planting for the reason stated.

Dip all corms before planting in a 1 in 1,000 solution of corrosive sublimate (mercuric chloride) for a period of about 8 to 24 hours. The material used in this solution is very poisonous and great care should be exercised in handling it. Dissolve ¼ oz. of corrosive sublimate in a little hot water in a porcelain or glass container, and then make up to a little over 1½ gallons, by adding cold water. Dip the corms by using an old string basket or some other non-metal container. Thoroughly clean the corms before dipping by removing the scales. Dipping will control bacterial scab which affects the corms and causes sunken black areas to appear, which split. Use a non-metallic vessel as a container for the solution.

In preparing the soil, old and well-decayed manure may be placed about 3 inches below the bulbs, but on no account should it be placed in contact with them. Some amateur gardeners tend to overfeed gladioli which results in coarse, ragged blooms.

Full-sized corms should be planted 3 to 5 inches deep—3 inches in the heavier cool soils, and 5 inches in the hot, dry types of sandy soil. Space the corms about 9 inches apart. Plant in rows or in small clumps, and after planting mark the position by means of short stakes. If the soil is moist there is no need to add water. Watering can be delayed until the plants have made good growth and dry weather is experienced.

Raising Seedlings

Seed sowing of summer annuals can continue this month and the more tender kinds can now be sown as well as the hardier ones.

Sowing can include Ageratum—*Blue Star*; Celosia (Prince's Feather and Cockscomb); Chrysanthemum—*Tricolor*; Cosmos—these can be obtained both in the mixed and in the *Klondyke Orange Flare* strains; Dianthus—mixed double hybrids which are very fragrant and make a bright display. Gaillardia—*Lorenziana*, a fine double annual of mixed colours Gypsophila—*Convent Garden*; Petunia—*Giants of California* and *Rose of Heaven*; Salpiglossis, and Zinnia—the tall giant dahlia-flowered ones for the back of the beds and the smaller *Lilliput, Linearis* and *Haageana* for the borders near the front of the bed.

When sowing, the seeds may be placed in seed boxes or seed beds. The seed box is a convenient method for the home gardener, who is usually cramped for space. A seed box should be about 4 to 6 inches deep with stout sides and bottom. Holes or slits should be made in the bottom for drainage. A box about 18 inches square is a suitable size and often two varieties of seeds can be planted in each box by placing a short batten across the centre. Place some clinker, coarse gravel, or broken crock on the bottom of the box and cover with well-rotted manure or leaf mould about 1 inch deep. Now put about 3 inches of fine sandy loam, which contains plenty of organic matter, in the box and gently press it and level it. Sow the seed thinly and cover with a light sieving of fine sand. If available, a sheet of glass should be placed over the box, and the box should be stood on a bed of ashes.

Light shading is necessary on sunny days, this can be provided by a sheet of paper or a piece of old hessian. As soon as the seed germinates, remove the shading and gradually remove the glass covering to harden off the young seedlings.

One of the most important things to remember is to keep the box perfectly level, so that watering, which should be done with a very fine rose or by standing the box in water, will not wash the seed to one corner.

IN THE VEGETABLE GARDEN

Soil Preparation

To be successful in growing vegetables this summer, it will be necessary to have well prepared soil. Approximately a month before any planting is commenced, dig in ample quantities of well-decayed manure or compost, or a light application of fowl manure. The only exception to this practice is for beds which are intended for root crops—carrots, parsnips, red beet, &c. Market garden manure dug in at the rate of 2 to 3 oz. per square yard or blood and bone manure, if obtainable, used at the rate of 3 to 4 oz. per square yard are very useful manures for supplementary feeding, but they should not wholly take the place of the organic manures.

Broccoli

Seed of both the green and purple sprouting broccoli may be sown this month in seed boxes or seed beds, and plants will be ready for transplanting in November. This vegetable is increasing in popularity and its delicate flavour appeals to many housewives.

Spinach

Round-seeded or summer spinach may be sown this month in drills in beds where it is to remain. Space the drills about 12 inches apart and cover the seed with about ½ an inch of sandy soil. Thin the plants to a distance of 4 inches apart as soon as they are large enough to handle.

Silver Beet

Silver beet is another vegetable crop which can be sown where it is to remain. Three good varieties are available—*Fordhook Giant, Dark Green Broad Rib,* and *Lucullus.* Two methods of sowing this seed are available—the first in the same way as spinach is sown, in drills spacing the seed evenly along the length of the drill and subsequently thinning the plants to about 12 to 18 inches apart. The thinnings, if they are well grown, can be cooked as greens. The other method is to place two or three seeds at intervals of about 15 inches apart in a row and cover them with about ½ inch of sandy soil. The beet "seed" actually contains more than one true seed and therefore six or seven plants may be obtained from a group of three seeds. As soon as the seedlings are large enough to handle, remove all but the strongest plant. This will leave plants in a row spaced approximately 15 inches apart. Silver beet seedlings can be transplanted if there are any misses in a row.

Lettuce

Iceberg and *Sureheart* lettuce seed or plants may be sown or planted this month. There is always an urgent need for lettuce in the home garden and a succession of crops should be planned. For this purpose a few seeds should be sown every three or four weeks. Lettuce is one of the crops which cannot be allowed to remain in the beds once they have reached maturity. If not used when it is ready it deteriorates. Space the rows 12 inches apart and allow about 12 inches between the plants.

RED CROSS . . . Calls the Roll

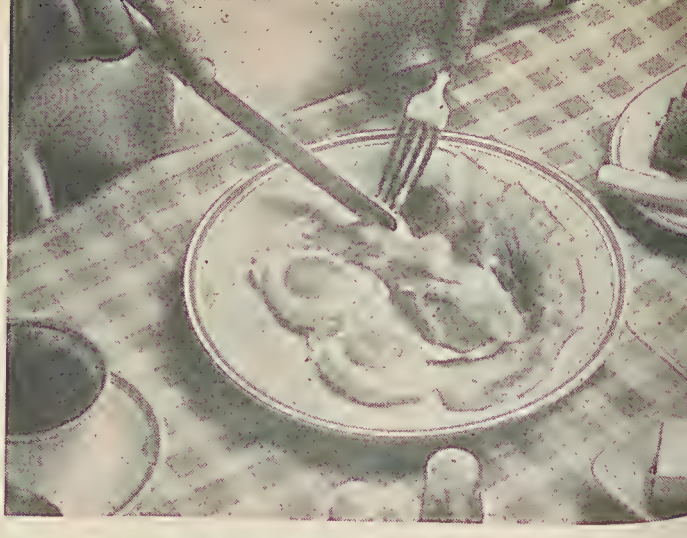
Roll Call is the name given by Red Cross to the Society's annual membership drive. It is calling the roll at the beginning of the financial year for new members and for the re-enrolment of old members.

Roll Call is not just another appeal for money. It's an appeal for moral support in the days that lie ahead. It gives an opportunity to every one of us to take our share of the responsibility in the plans for peace. When that time comes Red Cross will play its part in the rehabilitation of men and women of the fighting forces and of prisoners of war returned to their home land.

Throughout August, Enrolment Bureaux have been established in every city, town and village and at every Shire and Town Hall. Membership is 2s. and badges are 1s. each. Children may enrol for 1s. Join Red Cross to-day. [Australian Red Cross Society.

The Planning of Nourishing Meals . .

Some Hints for the Housewife



By RACHEL M. PEILE, Fruit Preserving Expert

IN planning menus, we must first consider the health of the family, after that, economy and convenience.

A simple daily diet can be arranged by using 1 pint of milk, 1 egg, 1½ ounces of butter, 1 potato at least, 1 serving of a leafy vegetable (preferably salad), 1 root vegetable, 1 serving of meat, 2 servings of fruit (1 citrus). (Organ meat—liver or kidney—and sea fish should be served once a week.)

As a Menu

Breakfast.—Orange; wholegrain porridge with milk or treacle; poached egg; toast; butter; honey.

Dinner.—Grilled chop; potato baked in jacket; steamed spinach; steamed carrot; apple.

Tea.—Lettuce, cheese or celery salad (or vegetable soup in winter); stewed or fresh fruit; wholemeal bread and butter; jam; milk.

Children's Lunches

The question of children's lunches is of great importance. The Oslo lunch, consisting of 2 or 3 slices of wholemeal bread, 1 oz. butter, cheese, half a pint of milk, an orange or an apple makes an excellent basis. Sandwich fillings, such as celery, tomato, banana, raisin, or nut, might be used for variation. A vacuum flask of soup; a vegetable salad wrapped in greaseproof paper are other suggestions. Wholemeal cake is nutritious and very palatable. If children are trained to eat correctly their tastes will develop for foods at first taken with some reluctance.

When economy has to be considered, the most important point is to grow as much of your own food as possible. A satisfactory diet requires a large proportion of potatoes, root and leafy vegetables. If possible, the garden is best regulated so as to give a constant supply throughout the year. Where this is not possible, vegetables could be preserved when plentiful for use in periods of scarcity. Tomatoes can be bottled; carrots pitted; cabbage or cauliflower pickled, and peas dried.

Fruits also can be grown. Many people could easily grow a greater variety than they do. A lemon tree, for example, is a great asset to any home garden. Fruit of all kinds can be bottled for use in winter.

In wheat-growing areas, breakfast porridge from cracked wheat can be cheaply prepared. A hand mill will grind wholemeal flour. Home-made bread and butter will mean a saving, as will the use of treacle to replace sugar. Potatoes can be used extensively and if cooked in their jackets are a valuable source of minerals. Fruits, milk drinks, fruit juices, savouries with cheese and raw vegetables can replace the more expensive cakes for in-between meals.

Here are some points worth remembering:—

Elaborate meals do not necessarily mean better health, so plan simple meals and make sure you have spare time for exercise in the fresh air and as much rest as needed.

Vary meals; if the same food is used, serve it differently.

Do not serve fats in any quantity. They are difficult to digest. Avoid frying food where it can be grilled.

Pastry should be served sparingly.

The slender nervous type of child requires milk, eggs, and body-building foods. The stocky type of person requires more of the bulky foods such as fruit and vegetables.

Malnutrition

Frequently we hear of malnutrition in the cities, and sometimes forget that it exists in the country, too. On questioning a country girl who was suffering from a skin infection, the writer found that her meals often included corned meat three times a day. A fruit-picking community whose diet lacked fruit and vegetables, and consisted largely of tinned food, was suffering from boils and other infections. Children attending one country school brought two or three sparsely-buttered scones for lunch, month after month.

Meal planning on the lines set out in the foregoing article should bring increased vitality and better health.

Some Economical Recipes

Wartime Broth.

1 cabbage, shredded finely.
¼ lb. fat, pepper, salt, and a little sugar,
1 carrot (sliced),
2 onions (chopped finely),
1 turnip (peeled and chopped),
½ cup barley,
½ cup of butter or haricot beans (previously soaked and cooked),
Enough stock or water to cover. (Vegetable water is very good.)

Melt fat in pan; add shredded cabbage. Cook gently, add other vegetables and flavourings and cover with stock. Simmer gently till all vegetables are tender. Serve hot. This soup should be thick.

Casserole of Liver.

1 sheep's liver,
2 oz. bacon,
¼ lb. of tomatoes,
Salt,
Seasoned flour,
Bread crumbs,
Stock or water with vegemite,
Chopped parsley.

Wash and skin liver. Cut into slices and roll in seasoned flour. Put into dish in layers with sliced tomatoes, seasoning and bread crumbs. Sprinkle with bread crumbs and put slices of bacon on top. Pour water or stock down the side to half fill the dish and cover with lid. Cook in moderate oven until liver changes colour (half an hour).

Apple Roly.

(May be made with fresh or dried apples.)

Short Crust Pastry.—Sieve half a pound of wholemeal self-raising flour and pinch of salt together. With tips of fingers rub in 2 tablespoons of good dripping or lard. Mix to a dough with half a cup of milk or water (more may be needed). Roll out half an inch thick.

Filling.—If using dried apples they should be soaked for an hour before using. Take 3 or 4 apples, wash well. Do not peel or core. Cut up roughly and place without water or sugar in a saucepan with a tightly-fitting lid. Place over gentle heat and cook very slowly till tender. Do not lift lid in early stages, but shake pan well. When tender, rub through strainer until only skins and seeds are left. Spread paste with a layer of apple filling and roll up. Pinch edges together, place in baking dish. Cream together 2 tablespoons brown sugar and 1 tablespoon butter. Spread over roly. Surround with water (2 tablespoons) and bake 30 minutes.

Wholemeal Lunch Cake.

4 oz. good dripping,
6 oz. sugar (or 3 oz. sugar, 3 oz. honey),
8 oz. self-raising wholemeal flour,
1 cup mixed fruit,
¼ pint of milk,
1 egg.

Cream the dripping and sugar, add the egg slowly and the milk, then the sifted flour and the fruit. Bake in a moderate oven for three-quarters of an hour.

Using Up Left-Overs

Porridge.—Use for the thickening of soups and stews. Thin it down with milk and strain for invalid gruel.

Cooked Eggs.—Use in pies and sandwiches.

Meats.—Use in rissoles, shepherd's pies, curries, stews—but remember, reheat only, do not cook.

Vegetables.—Use for vegetable pies or rissoles. Add to scones.

Cake and Breadcrumbs.—Trifles, puddings, custards.

Bread and Bread Crusts.—Make breadcrumbs. Cut into croutons and bake in oven, then store till required. Stuffings, puddings.

Vegetable Water.—Stocks, soups, stews.

Bones and Fresh Meat Scraps.—Stock.

TO-DAY it is in the national interest to spend less and save more. Extravagance is a vice; the person who spends lavishly is unpatriotic; he is not backing up the splendid efforts of our men on active service.

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Parcels of foodstuffs to relatives and friends in the United Kingdom may be sent through the Victorian Department of Agriculture. The Department has arranged for the despatch, through the post, of a small parcel of 5 lb. gross weight, conforming to the conditions laid down by the British authorities.

The parcel will contain a 12-oz. packet of raisins, a 12-oz. packet mixed fruits, a 12-oz. tin of full-cream powdered milk, a 12-oz. tin of lamb tongues, a one 12-oz. tin of cheese.

The cost of the parcel including packing, postage, &c. will be ten shillings and sixpence (10s. 6d.) for delivery to civilians and eight shillings (8s.) for delivery to members of the oversea forces in the United Kingdom, provided the full Service address can be given.

Orders will be accepted until further notice for despatch at donor's own risk to any address in England, Wales, Scotland, and Northern Ireland, and should be forwarded together with the necessary remittance to the Director of Agriculture, Public Offices, Melbourne, C.2.

Orders for parcels to residents in Eire (Irish Free State) cannot be accepted because of the heavy customs duty in that country.

The British authorities will not permit the receipt of parcels at frequent intervals, and only one order will be accepted at the one time for each recipient.

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Issued by direction of the Hon. N. A. Martin, M.L.A., Minister of Agriculture.

SUBSCRIPTION RATES

The Journal is issued monthly. The subscription, which is payable in advance and includes postage, is 3s. per annum for the Commonwealth and New Zealand, and 5s. for the United Kingdom and Foreign Countries. Single copy, Threepence. Subscriptions should be forwarded to the Director of Agriculture, Melbourne, C.2.

POSTAGE RATES

The postage required for this issue is:—To Australia and New Zealand, 1½d.; to United Kingdom, 2½d.; to United Kingdom via All-sea Route, 1½d.; to other British Possessions, 2½d.; to U.S.A. and Foreign Countries, 3½d.

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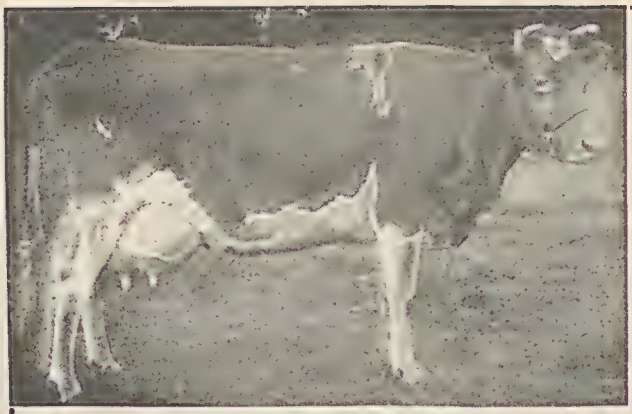

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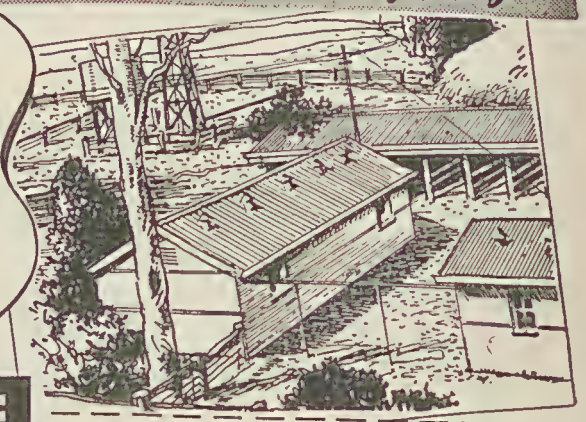

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ANNUAL SUMMER FODDER CROPS UNDER IRRIGATION

By L. C. BARTELS, B.Agr.Sc.,
Senior Agrostologist

A crop of irrigated sorghum growing at Swan Hill.

A GRAVE emergency exists at present because of the protracted drought and the consequent shortage of fodder, and irrigators on the Murray River systems have opportunities to help themselves and their neighbours by cultivating annual summer fodders. Sowing may commence in October and continue until January.

Irrigation farmers in the Kerang, Cohuna, and adjoining districts are familiar with these crops, and will be actively preparing for sowing them, as they have done in similar seasons.

Some farmers who are supplied from Yarrawonga Weir have already grown the annual fodders as preparatory crops, and those who will get irrigation water for the first time this year may appropriately sow summer fodders on suitable areas as an emergency measure for the benefit of themselves and their less fortunate neighbours, and as the first step in the preparation of land for permanent crops such as lucerne and pasture. The ground is hard and dry, but with tractors and disc implements sufficient tilth should be secured to permit rough levelling to facilitate the application of water. It is important that check banks be constructed to direct the water. These may be spaced 44 feet apart and extend for a length up to 15 chains. It is recommended that they be placed with some precision as the basis of the permanent layout, but for the emergency they may be simply plough crowns, delver banks, or banks drawn together by a V "crowder".

If sufficient loose earth is available, some preliminary grading is desirable, and the passage of the grader in one direction, and then at right angles, will automatically raze bumps and fill hollows. The banks will confine the water and make for more effective use and the saving of time and labour. This will make the work much more agreeable.

In present circumstances the land should be watered before sowing. After watering, it should be cultivated as soon as practicable and the seed sown in contact with the moisture. It should germinate well, and then attention to watering will ensure rapid growth.

Those intending to sow should obtain seed and manure as soon as they can. In Victoria, "annual summer fodders" usually refer to maize, millets and sorghums. Rape, mangels, and turnips are grown to a limited extent. The culture of these crops is governed by summer rainfall or by

Maize under irrigation at Myall.

irrigation facilities, and so we find them mainly in Gippsland, North-East Victoria, and in the irrigation areas of the North.

Annual summer fodders were commonly grown in the oldest irrigation areas, but the area of such crops has declined, undoubtedly because of the advances in cultural practices in those areas, represented by the growing of lucerne and mixed pasture.

Notwithstanding the decline in the cultivation of annual summer fodders in the irrigation areas, there is a place for them still. They make good preparatory crops when land is being put into shape for permanent crops. Land cannot be effectively graded in a brief period, and it is a wise plan to extend the grading over a year or two so that irrigation will reveal defects and allow earth fillings to settle. Summer fodders reflect good treatment, but they will withstand abuses in watering.

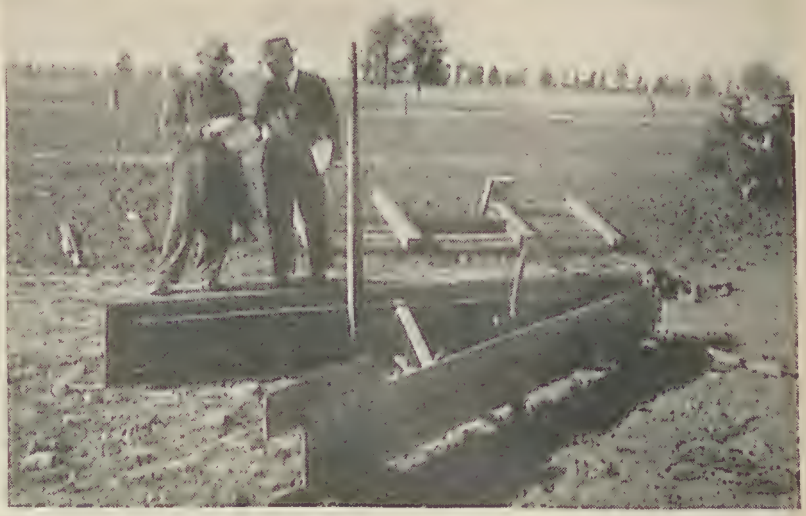
Millets and sorghums make good complements to leguminous crops such as lucerne. These fodders, which are gross feeders, are very suitable for sowing as interim crops, say on old lucerne land or on pasture land which it is desirable to plough up, perhaps for regrading or changing over to other cropping systems. Some farmers follow a policy of reploughing perennial pastures to take advantage of the accumulated fertility.

Annual fodders make good emergency crops. In years of drought, irrigation areas have absorbed stock from the dry areas, and summer crops put in hastily have maintained big numbers.

Lucerne is a perennial crop of the highest order, which requires careful application of water, liberal manuring and careful management. Lucerne does best on good soils, and is most suitable for cutting, as it can provide a succession of heavy crops through the growing period and may continue to do so for ten years and more.

Lucerne is a legume and enriches the soil. It is well adapted to areas where only partial irrigation is practicable. While it requires regular and careful irrigation for best results, it will withstand dryness.

Lucerne, in its turn, has been superseded by mixed pastures, which have been extended in the irrigation districts to nearly 300,000 acres. In this State they promise to stabilize conditions in the irrigation districts, as they grow well on all soils and in places where lucerne will not persist, and they are productive, nutritious, and palatable to stock, long lived and with sustained high carrying capacity. They are most productive when grazed, and this represents great saving on utilization costs. The conjunction of stock and mixed pastures liberally fertilized enriches the soil, and the oldest pastures at Werribee and elsewhere are turned in and the accumulated fertility "cashed" by growing vegetables and gross feeders such as maize and sorghums, &c.



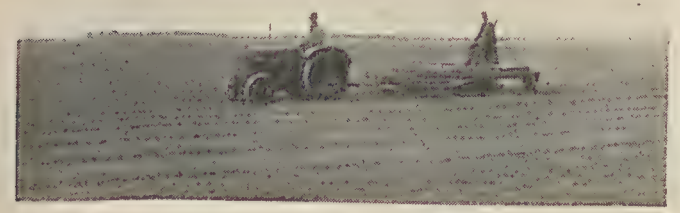
The delver used in conjunction with the plough for constructing delver banks or for channel making

Maize grows well under irrigation in the North, and it can produce immense crops utilized as green fodder, but it does not grow again after hard grazing or cutting. Mature crops of maize make good silage. Maize likes rich loamy soil and needs regular watering.

Grown for grain, maize is set out in hills spaced 3 feet and more apart. This permits inter row cultivation and cross cultivation, and under irrigation it will permit furrow irrigation.

Maize may be grown for green feed, but for this purpose the maize is usually grown with the plants fairly close together in rows spaced at 18 inches or less. Grown close together, the plant stalks are finer, but it is important not to have them so dense that light is shut off from lower leaves and stalks.

An effective way to establish a small area of maize in irrigation country is to irrigate, replough the land, and drop maize seeds a foot apart in every third furrow 4 inches deep. This will require about half a bushel of seed per acre. Manure may be dropped along the furrow too, a cwt. per acre if available. The maize may be flood irrigated.



The preliminary grading.

Any commercial variety of maize will be suitable for green feed, although a premium is usually placed on Flint Maize or the White Dent variety, Hickory King.

Millet and sorghums are the commonest annual summer fodders grown under irrigation in this State.

Although there are many varieties of millet, Japanese millet is the only one grown for green fodder here. It is well adapted to irrigation conditions, and when established and regularly watered it produces a succession of growths of palatable green feed relished by sheep and cattle.

To use an area of millet properly, temporary subdivision is desirable to permit grazing of sections in rotation. It can be grazed at all stages without danger of poisoning, and farmers need not wait for it to get to the flowering stage before grazing. Ordinarily it flowers when 2 or 3 feet high, but under good conditions it may grow 6 or 7 feet high. It is beyond its best stage for grazing then, but it can be conserved as silage or even as a coarse hay.

Millet seed is relatively small. It can be sown from the grain drill in close rows. Ten lb. of seed per acre is ample, and superphosphate at the rate of 1 cwt. per acre is recommended. The seed and manure may be mixed immediately before sowing and sown through the manure run of the drill.

Millet likes moisture, and the young seedlings particularly are sensitive to dryness. It is often put in under crude methods in "crabholey" land

Constructing the checkbanks.

because the plants withstand excess wetness, but, of course, the crop responds to good irrigation treatment.

The sorghums also include a great many types. What are called sweet sorghums are commonly grown for fodder, and in Victoria the varieties grown include Sudan grass, ambercane, imphee, and saccaline. The most popular is Sudan grass, and like millet it can produce a succession of growths, and an area of Sudan grass divided into sections and grazed rotationally will provide nutritious and palatable feed much relished by stock.

It must be pointed out that all these sorghums may occasionally become poisonous to grazing stock; it seems that the danger is greatest when plants receive a check in growth, and the new growth as they recover may be deadly. The danger diminishes as the plants mature, and the plants are regarded as safe when they reach the flowering stage. Risk is reduced if the fodder is cut, allowed to dry for a day, and then fed to stock.

Sudan grass growing under irrigation at Boort

In the case of Sudan grass the danger is remote. Cases of poisoning from grazing Sudan grass were so infrequent that for a long time after it was introduced it was supposed to be non-poisonous, but odd cases were recorded in South America and elsewhere, and then they occurred in Australia. Serious losses were experienced in Victoria after a grasshopper invasion when crops of Sudan grass were recovering from the attacks of the pest. Farmers blamed the seed merchants for supplying crossbred seed, but later on the same crops were grazed without any harmful effects.

Sudan grass may be sown like millet—10 lb. of seed per acre and 1 cwt. of "super.", if available, are appropriate rates for sowing.

A question frequently asked is which is the better fodder, Japanese millet or Sudan grass? Actually they may be appraised equally, except that millet requires abundant water for best growth, and Sudan grass is resistant to dryness; in fact, Sudan grass gives a fair prospect as a summer catch crop if sown on fallow, even when no irrigation is available.

Sudan grass is relatively fine-stemmed. It grows to 2 or 3 feet, but under good conditions it may grow much higher. Like millet, it may be cured and conserved as hay. Chaffing is desirable before feeding to stock.

The other sorghums—amber cane, imphee, and saccaline—are usually grown on limited areas. They are coarser plants than Sudan grass. They may be drilled in, but it is desirable to space the rows to permit development of the plants.

Ambercane is the earliest maturing of the three. It is fine stemmed, but usually grows to a height of 8 feet and more.

Imphee and saccaline are alike; they produce bulky crops of leafy coarse-stemmed fodder, which is cut progressively and fed to stock in autumn and early winter. They are appreciated because a small area of these crops, even when the leaves are withered, provides a reserve of coarse fodder for winter feed.

They may be grazed by cattle and even by sheep which learn to straddle the stalks.

These crops produce 20 to 40 tons of green feed which makes good silage. Crops with moderate development have been cut and baled as a coarse supplementary winter feed.

Dispose of Culls from the Poultry Pens

Poultry farmers short of help would be well advised to tabulate all jobs and give preference to the more urgent ones. Extra work, such as repairs to sheds, floors and equipment are always awaiting attention, but work concerned with the reduction of costs should be given first preference.

Each year the flock is culled, either by the poultry farmer himself or some other experienced person. A certain amount of time and energy is involved in this work, but quite frequently these culls, after having been segregated, are retained on the farm for considerable periods. There is no logical reason for retaining these birds, for they are usually in excellent condition for marketing when culled, as they have received the same attention as the rest of the flock. Quite often, when these birds are placed in the cull pen they are not given the same care as they have had previously, and consequently lose some of their condition. A number of these have probably never laid eggs, while others, at their best, are unprofitable, and any food given to them represents a loss. Each day they are kept on the farm adds to the feeding costs.

[Contributed by the Live Stock Division.]

Wheat as a Feed for Dairy Cows

Experiences of Those Who Have Tried It

By A. C. T. HEWITT, M.Agr.Sc.,* and H. G. TURNER, B.Agr.Sc.†

A SHORTAGE of concentrates usually fed to dairy cows has been one of the main reasons for the present serious decline in dairy production. The obvious solution of this difficulty would be to utilize surplus wheat as a concentrate. This has been frequently suggested, but conflicting opinions have been expressed concerning the suitability of wheat for this purpose. With the object of obtaining a representative opinion from practical dairy farmers who have tried it, a survey was carried out, covering several districts in Northern Victoria, South Gippsland and Broken Hill.

The prevalence of wheat-feeding varies greatly between districts, apparently depending on the extent to which supplementary feeding is practised, and the availability of more favoured feeds. The experiences of these farmers may help to overcome the widespread prejudice against wheat, and to reduce or eliminate the problem of feed shortage in the industry.

Extent of Enquiry

The districts visited were representative of a wide variety of types of husbandry ranging from the grazing of high quality perennial pastures on irrigated or unirrigated land, and of less productive annual pastures on dry land to conditions of complete bail-feeding which prevail at Broken Hill. In the South Gippsland districts, about 40 per cent. of the dairy farmers visited were feeding wheat; in the northern irrigation districts well under 5 per cent., and at Broken Hill nearly 100 per cent. The invesigators interviewed 43 farmers who had appreciable experience with feeding wheat. There were 22 in South Gippsland, nine in the North and twelve at Broken Hill. The survey covered 1430 milking cows being fed wheat as a concentrate, the average herd size being 33·3.

Period of Feeding Wheat

Many of the farmers interviewed had only a few months experience of feeding wheat at the time of the survey. However 25 (58 per cent.)

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had used it consistently for six months or more, several for two or three years and one for five years. Although most of them had been obliged to use wheat because of war-time shortages, several were attracted to it for other reasons. It is frequently the cheapest feed available, and in the mixed farming districts of Northern Victoria it is readily produced in a neighbouring locality if not on the dairyman's own farm; transport and handling charges are thus practically eliminated from the cost of the feed.

TABLE I.

Ration of Wheat (lb. per Cow per Day).	Number of Farmers.	Number Using Wheat with no Other Concentrate Except Protein Supplement.	Number Feeding no Roughage in the Bails.
Less than 5 lb. ..	10	7	4
5–6	9	8	2
7–8	12	9	3
9–10	3	2	0
11–12	5	5	2
13–14	1	1	0
More than 14 lb. ..	3	3	2
Totals	43	35	13

Quantities Fed

A wide range of quantities was being fed to individual cows depending on the season, type of pastures, the availability of other fodders with which to mix the wheat and the standards of feeding being adopted by the farmer. The average ration which farmers have fed consistently was nearly 7 lb. of wheat per day which is equivalent to about two quart measures per feed. The range and frequency of the various quantities are shown in Table I.

Twentyone farmers fed wheat as the only concentrate, fourteen added a small proportion of meatmeal or linseed meal, while eight fed a concentrate mixture containing up to 50 per cent. of bran, pollard or oats. Thirty of the farmers provided some roughage in the bails, but eleven fed wheat without either roughage or other concentrate (apart from meat meal). Eighteen made a practice of providing grass hay or other roughage in the paddock in the winter and frequently, as a precaution against bloat, in spring.

The practices and experiences of the four heaviest feeders are noteworthy and are summarised in Table II.

At the State Research Farm, Werribee, a concentrate mixture containing 59 per cent. wheat, 27 per cent. pea meal, 5 per cent. bran, 4 per cent. oats, 4 per cent. barley, and 1 per cent. meatmeal has been fed to members of a herd of over 80 cows at rates of 4 lb. to 21 lb. per head per day with very satisfactory results. This represents up to 12½ lb. of wheat per day.

Following the bush fires in the Morwell district, large quantities of ground wheat have been fed for the first time to dairy cows in conjunction with other feeds, and milk production during the past winter has been 25 per cent. higher than during the previous winter.

Precautions Necessary in Feeding Wheat

Sixty-eight per cent. of the Victorian farmers interviewed and eighteen per cent. of those at Broken Hill experienced no adverse results whatever from the use of this feed. A number of those who did notice some ill-effects when their herds were first put on to the new feed are now carrying on without any troubles while adhering to certain guiding principles of

TABLE II.

Farm.	Cows. Milked Number.	Wheat Fed per Cow per Day. lb.	Other Concentrate.	Roughage Fed in Bails per Cow per Day.	Roughage Fed in Paddock.	Type of Ground Wheat.	Period of Feeding Wheat.	Occurrence of Feed Sickness.
1	52	At least 6 up to 16	Meatmeal ..	Nil ..	Grass hay in winter	Fine ..	3 years ..	Very rare and mild
2	40	12–14 ..	Nil ..	Nil ..	Grass hay	Fine ..	3 months	Occasional cases Not serious
3	10	14 ..	Nil ..	5 lb. oaten chaff	Grass hay	Coarse	6 months	No cases
4	14	Up to 15 ..	Meatmeal ..	13 lb. oaten chaff	Nil ..	Medium	12 months	Two cases at first. None since

good feeding practice. About two-thirds of the farmers who have given wheat a trial are so satisfied with it that, provided the price is reasonable, they intend to continue using it, even when other feeds are readily available. Eighty-three per cent. find that it is very palatable as long as the cows are kept in good health. It was those farmers who had never fed wheat to their cows who showed the most prejudice to feeding it.

Over a number of years, 19 cases of laminitis in cattle (comparable with founder in horses) have been recorded at Broken Hill. These appeared to be associated with the feeding of wheat, frequently in the form of wheaten chaff. The nature of this trouble is not yet completely understood but, as cases are very rare, wheat can normally be fed without any fear of the trouble.

The more common ill-effects associated with wheat feeding are generally known as "off-feed" or "feed sickness". In mild cases the animal loses its appetite though it may sometimes be induced to eat some feed other than wheat. In more severe cases the animal shows definite symptoms of indigestion. Any such loss of appetite or digestive upset is reflected in a depression of milk yield, which may be severe but is only temporary. This type of trouble is not specifically associated with wheat; incautious feeding of any concentrate such as pollard or barley meal sometimes produces exactly similar effects. Wheat, probably on account of its heavy, glutinous character, needs to be used more carefully than other feeds.

Most feeders find that there is great individual variation among cows in their susceptibility to upsets of this kind, some being unable to take more than 4 to 6 lb. of wheat per day without going off their feed. Cows which are fed entirely on chaff and concentrates, appear to tolerate less wheat than those grazing on good pastures and receiving plenty of lucerne or grass hay. Heavy-milking cows with a good appetite generally have a higher limit to their capacity for wheat than have low producers.

Under given conditions there is for every cow a limit-quantity beyond which the ration of wheat cannot be raised without risk. If fed much more than this the cow typically shows a repeated cycle of behaviour in which she eats well for several days, becomes mildly sick for a couple of days and then returns to perfect health for a further period. Such cases are comparatively uncommon as the limit quantity usually lies beyond the normal range of feeding practice. Under most circumstances the only symptom which is likely to occur is a periodic depression of the appetite of a few individual cows and even this can be avoided if care is exercised in feeding.

It is important that, when wheat is first used, it should be introduced gradually and the reaction of each cow carefully observed so that individual rations may be adjusted accordingly. In those cases where ill-effects are feared, the wheat should be blended with bran or crushed oats in a 1:1 or a 1:2 mixture.

A further or alternative precaution is to mix the concentrate thoroughly with chaff. Any type of chaff is suitable including flax boll, lucerne, or cereal chaff, but it is most effective when not cut too short.

Although a large proportion of the farmers interviewed were successfully feeding wheat alone, this is not recommended as the best practice. The use of concentrate mixtures containing several ingredients is not prevalent in Victoria, but it has many advantages and might well be more widely adopted. Wheat, however, being at present the cheapest and most readily available feed, should comprise a high proportion of the concentrate ration.

Where wheat is being fed in comparatively small quantities as a "booster" for cows on high quality green pasture, no protein supplement need be provided. On the other hand, if the cows are on dry pasture and no high-protein fodder is being fed as when oaten hay is the only roughage, one pound of meat meal or two and a half pounds of linseed meal should be mixed with every five pounds of wheat. In most cases, when pasturage is fair in quantity and quality and a limited amount of lucerne or good grass hay is available, the proportion of meat meal must be adjusted to an intermediate value, usually about 10 per cent. of the concentrate ration. Oats, barley, and wheat all have comparable protein values so any one or any mixture of these needs approximately the same percentage of protein-rich supplement. High-protein concentrates such as meat meal are in short supply at present so every feeder, while appreciating their fundamental importance in stock feeding, should learn how to make the best use of the quantity available. It is as wasteful of feed to use too little protein-rich supplement as it is to use too much.

To counteract the deficiency of calcium in the wheat, 1 or 2 lb. of lime (ground limestone) should be mixed with every 100 lb. of crushed wheat fed.

The Preparation of Wheat for Dairy Cattle Feeding

Many types of crushed and ground wheat are being used in various districts and all types have been fed successfully in quite large quantities. However it is clear that the kind of milling treatment given the grain is a factor worthy of considerable attention.

The majority of farmers were found to be feeding finely ground wheat meal, not because they preferred it, but because it is frequently the only type of ground wheat available. While this finely ground product makes an excellent feed for pigs and can be included in poultry mashes, it is not altogether suitable for cows. The texture is "heavy" and unless it is mixed with a proportion of bran or chaff there is a danger that it will run together and cause digestive trouble in some cows.

On the other hand, wheat which is merely cracked is not entirely satisfactory because, as with whole wheat, it is not penetrated by the gastric juices in the process of digestion and a large amount is wasted. The ideal is to have the grain rolled to a flaky condition which approaches that of bran and contains a minimum of fine flour. Such a product is that taken from the "first break" in the flour-milling process and this is being distributed by some mills. A number of farmers who had experienced some feed sickness when feeding fine wheat meal, overcame their troubles when they were able to obtain the flaky product.

A rough indication of the suitability for feeding of a sample of crushed wheat is the weight per bushel or per gallon. Whereas a bushel of fine wheat meal weighs 40 to 50 lb., a good sample of rolled wheat, according to American authorities, would weigh as little as 34 lb. per bushel.

Wheat ground to a gritty texture where the majority of the particles are the size of sugar crystals is also quite suitable for feeding to dairy cows. As this type of ground wheat can be produced by the small grinding plants used on farms, and by those used at butter factories and some local produce merchants, it is the cheapest wheat product to feed in Victoria.

The best way of obtaining a satisfactory type of crushed wheat at the least cost is to buy the grain in bulk and crush it on the farm. The cost of purchasing a machine would be justified in the case of any dairy farmer who feeds concentrates fairly consistently and who also keeps a number of pigs. A plate grinder which can be run by a two or three horse-power engine such as is used for milking machines, can be obtained for less than £10 and the total cost of grinding would be 2d. to 3d. per bushel.

Where individual farmers are not prepared to make the necessary outlay, a co-operative scheme could be arranged. This could be a private arrangement among a small group of farmers or it might well be run by the local butter factory. It is in the interests of the factory, even if it be a proprietary business, that a good cheap cow feed should be readily available to its suppliers. The scheme should be run on truly co-operative lines so that wheat is distributed at cost, and the actual feeders of wheat benefit by the enterprise. A co-operative butter factory, store or trading company should not use profits from the sale of wheat to support other departments of its business. This would penalise the heavy feeders whom the scheme should be designed to benefit.

In Central Gippsland, the Drouin Co-operative Butter Factory Co., Ltd., recently increased its produce department and installed a grain gristing plant. During the past season it has produced very large quantities of ground wheat for its suppliers who have benefited considerably by the enterprise.

The Value of Wheat

Many farmers believe that ground wheat is a comparatively expensive feed. They fail to take into account that a bag of wheat weighs much more than a bag of oats, pollard or bran and that, pound for pound, wheat has a higher food value. Table III. compares the effective prices of crushed wheat and three other common feeds.

TABLE III.

Feed.	Price per Bushel (60 lb.) (Melb., Sept. '44).	Number Food Units per 100 lb.	Price per Food Unit.
	s. d.		*d.*
Crushed Wheat	1 6	72	1·25
Bran	1 5	44	1·93
Pollard ..	1 5	69	1·23
Crushed Oats ..	2 0	62	1·96

It will be noticed that bran and crushed oats are each 60 per cent. dearer than crushed wheat. These figures are based on Melbourne prices for small lots and they may be modified considerably in country districts and under conditions of large scale buying. However, the comparison remains sound for most circumstances; the cost of crushed wheat is subject

to a reduction of 15 per cent. or more when farmers, singly or jointly, purchase through the Australian Wheat Board and arrange their own milling.

Conclusions

In the hands of many farmers wheat is proving a valuable cow feed well fitted to take the place of other feeds which are in short supply.

Although wheat has been successfully fed alone, it is advisable to mix it with some concentrate of a more open texture or with chaff and to add an appropriate amount of protein supplement. One per cent. of ground limestone should also be included.

Wheat should be introduced gradually and individual rations adjusted according to the reaction of the cows.

The milling process should be such as to yield a crushed wheat with an open texture, containing as little free flour as possible. However, quite a satisfactory product can be obtained with a suitably adjusted plate grinder which is the most economical machine for a farmer to purchase.

Where local grinding facilities do not exist the "first break" product from a roller mill with the finer fractions removed is recommended.

Because of the improvement in the shipping position, flour mills are now working to capacity and supplies of bran and pollard have improved greatly in the last few months. However, as wheat is a cheap and readily available feed, farmers are advised to use it more extensively and to maintain it as a major constituent of the concentrate ration.

Safety Guards on Chaffcutting Machines

Contributed by the Department of Labour

THE use of chaffcutting machines not fitted with safety devices has resulted in a large number of serious accidents in Victoria over a period of years. Many of these accidents would not have occurred if the machines had been properly guarded, as required under the Factories and Shops Act. A recent accident in which a Wimmera farmer lost his hand in a chaffcutter, and several other mishaps involving these machines, draw attention to the fact that some users of chaffcutters are not observing the requirements of the Act.

Briefly, the Act provides that every chaffcutting machine (whether in a factory or not) shall be provided with guards constantly maintained in an efficient state, and properly adjusted. If the owner or hirer of such machine does not comply with the provisions he is liable to a severe penalty. Penalties also are prescribed for persons who operate a machine improperly guarded, and for the makers of chaffcutting machines or their agents or any seller of such a machine, who deliver to a purchaser a machine not equipped with guards as prescribed.

What the Regulations Provide

The owner or hirer of any chaffcutting machine (whether the same is in a factory or not) shall equip each machine with—

(*a*) a guard which will at all times cover the feed-box for a distance of twenty-five (25) inches from the centre of the feed rollers; the height of this guard measured from the bottom of the feed-box to the top of the guard shall not in any case exceed twenty (20) inches (inside measurement);

(*b*) a reversing lever which must either be carried over the top of the guard in line with and three (3) inches above the edge of the guard nearest the operator, or be connected with a foot-control device of a pattern and make approved by the Secretary for Labour;

(*c*) guards which will efficiently cover the upper half of the knife wheel and all gear wheels, so as to prevent bodily injury to any person in the vicinity thereof.

Paragraphs (*b*) and (*c*) of this clause shall not apply to machines operated solely by hand power.

SOIL DRIFT CONTROL

Results of Competition, 1943-44

Report of the Judge—HAROLD HANSLOW, Commissioner,
State Rivers and Water Supply Commission.

A well-sheltered dam on a Torrita farm.

THE fourth Soil Drift Control Competition conducted by the State Rivers and Water Supply Commissioner in the Victorian Mallee has been concluded. This year there were 33 entrants representing an area of approximately 40,000 acres scattered all over the Mallee. The competitors were keen and it was not easy to decide the winner. These men have recognized how vulnerable t eir soils are to wind erosion and the vital need to find methods to hold them. Past experience has shown these competitors that, with the light and variable rainfall in the Mallee, it has been difficult enough to make a success of wheat growing when all the soil that nature had provided was there. They realize just how much more difficult their task would be if they allowed most of their soil to blow away. Soil is being blown from some Mallee farms at an alarming rate, and it is quite common to see subsoil and even limestone exposed on the fallows, on land which was virgin Mallee twenty years ago. At this rate of deterioration what will the next twenty years show ?

The sand hills are rapidly eroding, the process in many cases being deliberately encouraged in an endeavour to improve the heavier land on the flats. Observant farmers, however, have noticed that more soil has been blown from the hills than was intended and that, once started, the soil on the high ground has been hard to hold. This has resulted in denudation of the hills and deterioration of the flats which now, with a mixture of sand in them, are also drifting.

Mr. V. Watson, of Nyah West, was the winner of this year's competition. In the season 1928–29 this competitor had a fallow worked down very fine. Later that year inches of soil were blown off this paddock and although it was one of his best paddocks, Mr. Watson now gets from it bags to the acre less than the yield obtained from the rest of his farm. The productive value of this land has been reduced for all time. The experience however, has been taken to heart by this competitor, who does not work his land that way now.

This land was cleared less than 20 years ago, and already four feet of the surface soil has gone.

As a general rule sand hills should not be fallowed, but if this has to be done they should be fallowed early, cover-cropped and not grazed too bare. Neither should they be left too long in grass. However, they can be cropped early in the season while the ground is still warm, provided there is plenty of moisture in the soil at the time of sowing. One competitor, who had previously not fallowed his sand hills, departed from the practice and paid dearly for his action in recent soil loss.

Many Mallee farmers lose sight of the fact that, in addition to the drift soil lying in the hollows, dams and channels, and the soil that buries their fences and makes their roads impassable, finer particles of soil blow away, to fall as red rain in distant parts of the State or to be carried out to sea.

This year at Murrayville a farmer wishing to remove a large accumulation of soil against one of his fences on the windward side of a fallowed paddock, worked the strip very finely. This soil blew over the fallow twenty chains, and then ten chains to a grass paddock. A handful of soil was taken from the extreme edge of the deposited area back to wheer it was blown from. On comparison with the sand left behind it was found to be darker in colour and very much finer in texture. In addition, the finer material had also been carried away in the atmosphere. In effect the land had been winnowed and the best soil blown away.

Again and again attention has been drawn to the danger of over-stocking on this country. Sheep walk round and round a property in search of feed, cut up the light soil with their small feet and eat every particle of vegetative cover, opening up the land to the wind, with the result that the unprotected soil blows away, burying fences, covering roads, and filling dams and channels.

The following is an extract from a report of a District Officer of the State Rivers and Water Supply Commission on the difficulty of supplying water to settlers along 34 miles of channel on which the estimated cost of cleaning out the sand alone is £2,200. (The water rate to settlers was £394.)

> "The work of cleaning the channels of drift sand has increased to such an extent that it will be extremely difficult to maintain a stream of water along some sections where heavy drift has reached and is overhanging channels on both sides.
>
> "Most of the country through which the system runs is light and ridgy, and subject to drift. Quite an area of the land along the channels is rented annually from banks as mortgagees in possession, absentee owners either private or trustees. Generally, where the land is so rented, it is used primarily for grazing.

Left—An irrigation channel culvert at Sea Lake sanded to the brim. Right—Where the drift sand came from.

"The trouble is not confined to areas close to the channel where restrictive measures over the channel easement would avail little. It would seem that, if the supply of water is to be maintained at reasonable cost, some general restriction and limitation of grazing (if practised without cultivation and sowing) would be necessary for retention of protective cover."

Settlers at the ends of channels such as the above are becoming isolated, as it is extremely difficult and costly to bring water to them.

In April, 1943 a farmer in the Werrimull district took the compensation and left his block. On this property there was a fallow paddock adjoining a two-chain road. The writer saw this paddock again in April, 1944 and for half a mile the fallow had drifted and covered the fence to within a foot of the top. It had also covered the two-chain road, and the fence on the other side of the road to within a foot of the top, and had gone into the next paddock for a couple of chains. The fences, worth £80 a mile, and the road are now useless. The paddock has been denuded of its topsoil (estimated at 150,000 c. yds.) Similar cases are not uncommon.

The first sectional competition to be judged this year was that in the Dimboola and Karkarooc shires. The season in this part of the Mallee had been fair, for although the rainfall was light, the rain came at the right time and the weather was cool and the yields fair. The farmers in this section presented good entries.

Mr. F. J. Hofmaier, of Rosebery, who farms 1,420 acres, was the winner. His chief measure of control is to work back all stubble into the ground. He uses a tractor and disc implements which he believes in keeping very sharp. Bencubbin is the wheat favoured on account of the extra straw it grows. Seeding is 90 lb. of wheat and if available, 90 lb. super. per acre. Last year 720 acres of fallow yielded 21½ bushels of wheat to the acre. This competitor also had 100 acres of oats and 120 acres of barley sown on stubble. Mr. Hofmaier has a double disc-harrow, between which he has fixed the combine with the "floats" removed. The seed is spilt on to the ground and covered with the rear disc as illustrated. This does an excellent job even in heavy straw. There was no evidence of drift anywhere. The home and surroundings, garden and trees showed how pleasant a Mallee farmstead could be made. No fallowing is done near the house or dams. Conserved fodder amounting to 200 tons of hay was on hand, together with 1,000 bags of oats and barley.

A close-up view of a Mallee sand dune showing the humus and organic matter riding on the surface of the sand.

Sowing barley in a heavy stubble with drill and disc harrow combination.

The block of soil beside which the figure is standing indicates the original depth of soil covering this Mallee paddock.

Mr. G. F. Clugston, of Brentwood, with 1,060 acres, was second. Here, too, is an example of how well protected and pleasant a Mallee home could be with plantations and gardens. Mr. Clugston works his land into a very cloddy condition so that it will not drift. He also works back as much stubble as possible, fallowing any time from July to September with either a disc plough or scarifier, whichever will leave the most clods. Heavy ground is worked twice before harvest; light land is ploughed deeply and kept clean with sheep. If stubble land is fallowed a scarifier is used because it leaves more straw on the top.

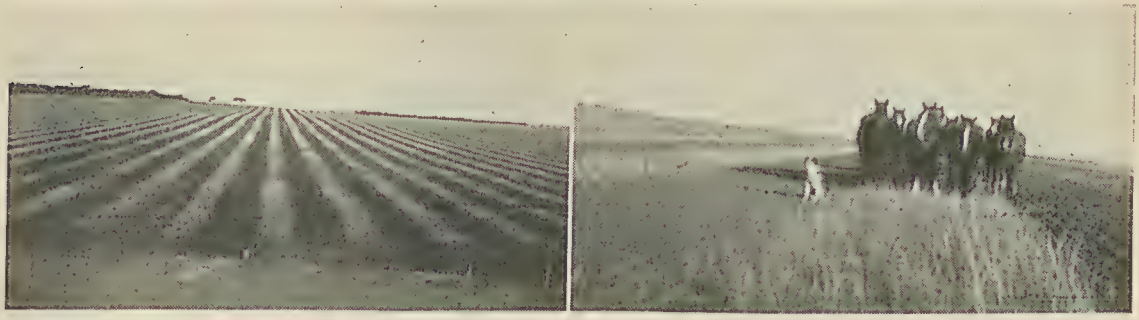
On account of the number of entries a third prize was awarded in this section, and it was won by Mr. W. R. Bodey, of Beulah.

The Birchip, Wycheproof and Kerang Shires Competition was won by Mr. H. G. Broad, of Woomelang, with 1,560 acres. Here again was a good example of a comfortable Mallee home, with a good tank and garden. Mr. Broad uses a tractor. No drift was evident on his property. There were ample reserves of fodder. Mr. Broad also endeavours to get the straw back into the land. The rotation practised was wheat, oats, fallow and wheat, the fallow varied occasionally to barley or grass. Fallowing is done in August and September both mouldboard and disc plough being used. If working fallow after disc plough only a scarifier is used. After the mouldboard plough, a large clearance cultivator is used. When cultivating stubble this competitor ploughs with disc followed by overhead draft scarifier. When straw is too heavy for the scarifier to work, oats are sown with disc plough. May sowing of wheat is preferred if the season permits, 60 lb. of seed per acre of Ghurka, Rance 4H, Regalia and Quadrat or Gallipoli being sown.

Mr. Broad says that, if implements could be made to go through straw easier, much less stubble would be burnt. By placing another bar on each of the floats of a spring tyne cultivator, he has doubled the space between the same number of tynes. A demonstration in heavy stubble gave remarkable results, the straw passing easily through the machine.

Mr. Harold Gillies, of Beauchamp, Kerang Shire, with 569 acres was second. This is very light country and Mr. Gillies was almost in despair when he decided to go in for strip cropping. By this system he is holding his land. The land is worked in strips the width of the combine, one in fallow and one in crop. At present this competitor is working on a crop, fallow, crop basis but he realized that this is asking too much of the land and proposes to vary the rotation. Mr. Gillies says it is remarkable how soon the horses get used to working the strips. He is quite happy now that he has beaten the drift problem, and he deserves much credit for his efforts.

The Walpeup Shire Competition was won by Mr. R. N. Johns, of Danyo. This Shire was suffering the effects of a severe drought, having



Two views of a strip-cropping experiment carried out on the property of Mr. Harold Gillies, Beauchamp, near Kerang.

had only 776 points of rain for the year. Practically no fallows were sown last year.

Mr. Johns was farming 1,424 acres in very light country. Sheep and wheat were his main lines and the layout was good, showing again that the Mallee can smile when treated the right way. Mr. Johns fallowed early and late. The early fallow was cover-cropped and it was claimed that what was lost in yield was made up in returns from fat lambs and in holding the land. The competitor had a good deal of winter and spring feed off the land he ploughed late, and by turning the grass under before it seeded, it turned over in a sod and there was no need to sheep it afterwards as the sods remained intact until cropping time.

This sand ridge has completely buried the fence which runs under the dune.

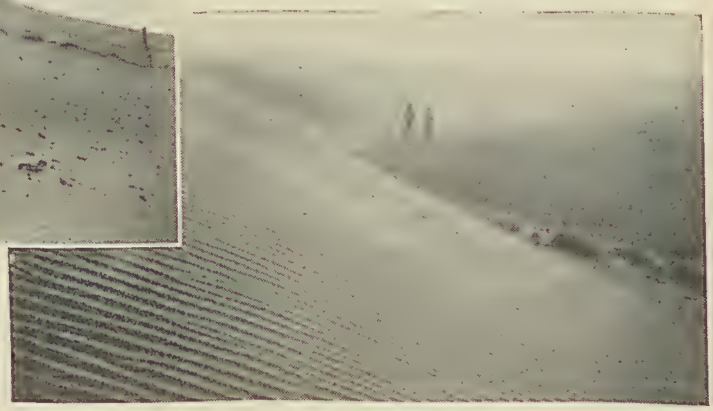
Mr. F. W. Boettcher, of Gunamalary, Murrayville, was second, with 640 acres. This is another case of too small an area for such a light rainfall. However, Mr. Boettcher has now acquired more land. Here also was a case of late ploughing and leaving the land in the sod. It was holding well. No stubble has been burnt on this property for many years.

The Mildura Shire competition was won by Mr. F. S. Callahan, of Karawinna, with 1,711 acres used for wheat, hay and fat lamb growing. This Millewa country is difficult to hold. Not only is the rainfall light, but the country seems very liable to drift. The district was passing through a dry time. No fallows were sown in 1943 and from April, 1943, to April, 1944, only 330 points of rain had fallen.

Mr. Callahan uses a tractor. Methods used to prevent drift were—

(1) Moderate stocking;
(2) Not working the land when it is dry;
(3) Fallowing once in four or five years only and having a sod to plough under;
(4) Working land as little as possible after fallowing.

Mr. A. J. Brown, of Carwarp, was second. He also is a farmer who uses a tractor to work his land. He farms 8,000 acres for sheep and wheat. The land is light. Rotation is—fallow wheat, oats, self-sown oats, then grass. The property carries the best sole of Arabian grass (*Schismus barbatus*) the writer has seen. Fallowing is done with a mouldboard plow, and the fallow is not worked until cropping time. The 1942 fallow was not sown in 1943, and had not been touched since. It was holding well at the time of inspection in April, 1944.



Sand dunes near Werrimul. The mist is due to sand and dust blowing along the surface.

Mr. Brown has made a feature of water supply having three large dams well protected from drift by native bush. Water is gravitated to different paddocks by pipe and there is a nice garden at the dwelling. Careful attention has been given to fodder conservation.

The Swan Hill Shire competition was won by Mr. V. L. Watson with Mr. R. G. Pearce second. Both are at Nyah West. Mr. Watson also won the Mallee Championship and the Hanslow Cup. This competitor was first in the Swan Hill competition in 1942 and was second in the Cup final in 1943. He uses horses and is justly proud of a fine team of Clydesdales. Mr. Watson's farm contains 2,400

"Working-over" fallow with a disc harrow after the land had been ploughed with a heavy disc.

acres which is used for wheat, sheep and horse breeding. His home is situated among native pines, and although it was the best protected home in the competition, Mr. Watson has planted and is still planting more ornamental trees. There are five dams filled from Water Supply Commission channels, and two catchment dams. These save the cutting up of paddocks by stock having to walk far to water.

There are three miles of channel on the property. These channels and the dams were free of drift. The practice followed, if the season permits, is fallow, wheat, oats and grass for one or two years. Fallowing is done from June to October. The mouldboard plough is preferred, but in heavy stubble a disc plough is used and only sufficient cultivation is done to keep weed growth down, the spring tooth or scarifier being used for this purpose. 45 to 50 lb. of wheat are sown with 40 to 60 lb. of "super." if available. Ample supplies of fodder were on hand at the time of inspection.

When asked what he considered to be the best method to prevent drift Mr. Watson replied, "By giving careful thought to the kind of soil of which the farm is composed, how and when to work it, and to turn in as much grass or straw as possible. When ploughing or cultivating don't travel too fast. Grazing by sheep should be carefully watched. Over-stocking by sheep is the greatest danger for starting drift in certain periods of the year. Understocking over a period of years is more profitable."

Mr. Watson's farm is an excellent example of drift prevention and contrasts sharply with some of the neighbouring properties which are eroding badly.

All the Cup finalists had done an excellent job, but special mention must be made of Mr. T. Parker of Karween, via Mildura, who came second. This competitor has an area of 1,944 acres of light hilly country subject to drift. Before he undertakes any work on his farm, Mr. Parker considers the effect it may have on drift. No stubble is ever burnt. He endeavours to work as much stubble as possible back into the land and sows Wimmera rye grass with his crop for stock feed later. All cocky chaff is carted home, stacked and found to be a wonderful stand-by. There was also 150 tons of hay on hand at the time of inspection and although it had been too dry to sow any fallow last year, there were 200 ewes on hand in fat condition. Fat sheep were being sold and 150 lambs had been put off early at 8s. 6d. per head. Mr. Parker wisely considered that it was better to take a low price for them then than to finish them and leave no feed for the ewes. He aims to sow down all areas likely to drift, to retain all stubble and to stock carefully, to plough in stubble when fallowing, and to work as little as possible afterwards. He even encourages "Paddy melons" and "roly-poly".

Drift sand-hill 25 feet in height at Kooloonong.

The Mallee is a fine province capable of producing wealth for all time, but it is rapidly deteriorating, and this competition is a cooperative effort to find ways and means of halting and finally preventing this deterioration. The organizations, McKay Massey Harris Pty. Ltd., International Harvester Co. Pty. Ltd., the State Savings Bank of Victoria, the Geelong Wool Brokers' Associations, Messrs. Kimpton and Son, Thomas and Sons, and Noske Bros., again provided the prize money. The State Rivers and Water Supply Commission conducted the competition.

Scooping sand from a Mallee irrigation channel.

Lessons that have been learned from the competition are :—

Don't burn stubble.
Don't work dry land.
Don't fallow the tops of sandhills.
Don't fallow the land adjacent to dwellings, roads, channels, dams and leave these lands bare.
Don't sow them dry. (One competitor did this last year and these areas drifted badly, spoiling the water in the dam and making conditions bad around the home).
Don't be afraid to have your fallow rough and cloddy except at sowing time.
Don't forget to roughen up or ridge your land after rain.
Don't travel too fast when cultivating, especially with the disc plough. This breaks up the sod and leaves it in a condition likely to drift.
Don't, above all things, over-stock—this is the easiest trap to fall into and one of the worst mistakes for you, the sheep, and the land.
Don't be afraid to have too many dams or have them too big.
Don't allow soil or manure from the sheep camp to blow into the dam. This makes a great deal of work to clean out, and is very rough on the sheep. Unhealthy sheep don't pay. The writer wouldn't like to drink that water: would you? Ryecorn sown for two chains around the dam when the ground is moist will prevent this.

In Canada where there had been a great deal of trouble with drift a Soil Drift Act was passed. This Act does not compel farmers to adopt drift control measures, but it does throw the responsibility on the farmer who allows his land to drift over his neighbour's fence, dam or farm. It is recognized that there are certain known methods by which drift can be prevented. If a farmer has sustained damage he may sue, and if he can show that he himself is practising these methods he can get a verdict but not otherwise, neither can he get a verdict if the neighbour is reasonably practising these methods. A public utility can also sue.

During the judging the writer saw cases where a few careless farmers had allowed drift to bury their neighbour's fences, to block gateways, to fill cattle pits, to cover crops, roads, railways, dams and channels. The question suggests itself—should this be the bad luck of the sufferer or the responsibility of the careless farmer?

A metal road near Manangatang blocked by a sand hill

Artificial Insemination of Live Stock

Its Uses and Limitations

By D. S. WISHART, B.V.Sc., Veterinary Officer, State Research Farm, Werribee

The use of artificial insemination as a method of improving the standard of livestock has recently received considerable attention in many parts of the world. The Victorian Department of Agriculture has commenced an investigation at the State Research Farm, Werribee, to determine the value of artificial insemination under local conditions.

ARTIFICIAL insemination involves the use of artificial methods of transferring semen from the male to the female, and actually involves three separate procedures:—(1) the collection of the semen from the male; (2) the handling and transport of the semen, including an examination to determine its fertility; and (3) the insemination of the female, i.e., the introduction of the semen into the genital tract of the female.

In natural service, semen is deposited directly by the male into the genital tract of the female. It is therefore immediately obvious that the progeny resulting from any artificial mating will be of a standard equivalent to that which would be obtained by natural mating of the particular sire and dam, as in each case both sire and dam will contribute to the genetical make-up of the offspring; the only essential difference is that in the artificial method the semen is carried from the male to the female.

It is not possible by the use of artificial insemination to produce more than the normal number of offspring from one female. It has been claimed in a recent report from the United States of America that a number of calves can be produced from one high-class cow in each year; this claim would involve the highly technical operation of transferring each ovum ("egg") from the high-class cow to a scrub cow (the latter acting as an incubator for the calf), and this operation should not be confused with artificial insemination.

The chief use of artificial insemination is that of enabling greater use of valuable proved sires. A healthy male ejaculates at each service more than enough semen to fertilize the ovum of one female, and by artificially collecting this quantity of semen it is possible to inseminate several females from each service; still greater numbers of females may be inseminated if the semen is diluted, after collection, with special diluting fluids. It is also possible in some cases to collect semen from males which are unable to perform natural service as a result of injury or old age.

When certain precautions are observed, semen from the males of certain species, notably the bull and the ram, can be held at low temperatures for a period of several days before use; stallion semen can be kept only for a few hours, while boar semen must be used almost immediately after collection. Transport of semen for any distance necessitates the use of a special container, such as a thermos flask, in which the low temperature can be maintained during the period of transport, and the limits of distance are determined mainly by the efficiency of the container in maintaining the necessary low temperature.

As well as extending the use of proved sires, artificial insemination can also be used in proving young sires, as a greater number of progeny can be bred from the young sire, and his value may thus be determined more accurately than is possible with natural breeding.

Examination of the semen enables a regular check to be kept on the fertility of the sire, and ensures that only fertile semen is used. This in turn assists the owner to

eliminate infertile females, as these are readily detected from the accurate breeding records which are essential to the success of any scheme involving the use of artificial insemination.

There are other minor advantages of artificial insemination, such as the fact that a small female can be mated to a heavy male; also the possibility of dairy farmers being able to dispense with their bulls where their cows can be artificially inseminated.

From a consideration of these points, it can be seen that there are definite benefits to be gained by the practice of artificial insemination, and it appears that this method of breeding offers a means of rapidly improving the standard of any live stock. There are, however, certain disadvantages which must be considered in deciding on the usefulness of artificial insemination in live stock breeding.

The techniques involved in the practice of artificial insemination require expert operators as considerable knowledge and skill are essential to the success of the various procedures, and it will be necessary for men intending to take up this work to be trained to a high degree of efficiency.

Females can be successfuly inseminated only at a certain stage of oestrus ("heat"), and it is therefore necessary that the visit of the inseminator should coincide with the occurrence of oestrus in the female to be inseminated. When a large number of females is to be inseminated, a number of visits will be necessary.

Apart from the use of artificial insemination in stud breeding, a co-operative system seems to offer most promise as a means of using artificial insemination on a commercial scale. In the United States of America a number of co-operative societies for the artificial insemination of dairy cattle has been established, and it has been found that the success of these organizations, as with any co-operative scheme, is largely dependent on the administration and financial management.

The smallest of these societies contains about 1,000 to 1,200 cows within a radius of 10 to 15, or at the most 20 miles, and owns three bulls. A society of this size employs one inseminator, who collects the semen at the centre at which the bulls are kept, and makes a daily round to visit those farms on which cows have been reported to be in season. Larger societies, employing several inseminators, work on the same principle. It is obvious that a considerable amount of organization is necessary for the efficient and smooth running of such a scheme, and experience has shown that the overhead costs must be kept to a minimum, particularly in the smaller societies, if the cost to the farmer is to be kept within economic limits.

The cost of artificial insemination will naturally be greater than the cost of natural breeding. It has been found both in England and the United States of America that the cost in dairy cattle is in the vicinity of 25s. to 30s. per cow, which covers up to three inseminations if necessary. This cost is made up from the cost of bulls and replacements, the feed, housing, management, and insurance of the bulls, the salary of the inseminator, and travelling expenses. An estimate of these costs under local conditions shows that the cost per cow in Victoria would probably fall within the same range.

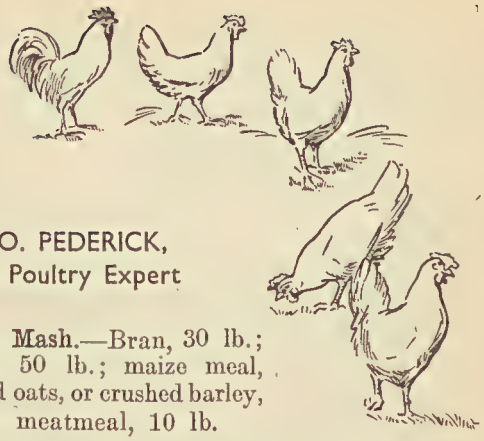
Though some breeding difficulties, such as a female which refuses service, can be overcome by artificial insemination, this method of breeding cannot be expected to overcome any causes of infertility in the female. It can be taken for granted that, when a sire of known high fertility has been unable by natural service to impregnate certain females, then artificial insemination will usually fail to impregnate these females for the same reasons.

A study of the foregoing shows that the limitations of artificial insemination are determined *not* by the maximum number of females which can be inseminated from one male, but by organization which is required to ensure that semen from the male reaches each female to be inseminated at the time that female is in oestrus.

In a consideration of the economics of artificial insemination, the actual cost must be considered in relation to the potential results of this method of breeding. Many farmers, instead of using their own probably inferior sires, whose progeny are of a correspondingly low standard, would have at their disposal the use of an outstanding sire known to be of high fertility. This would enable them to breed

[*Continued on page 452.*

Poultry-Keeping on the Farm



By W. O. PEDERICK,
Assistant Poultry Expert

A FARMER may run only a small number of fowls as a side-line, but it will pay him to give these birds the same care as he devotes to his other farm live stock. With a little attention given to such important factors as breeding, feeding, housing and marketing, a few fowls can become a quite profitable source of income.

Breeding

Breed only from pure-breeds of a proved laying strain. Egg production is the most profitable branch of poultry-keeping, and White Leghorns and Australorps have proved to be the breeds most suitable for this purpose.

Average production can be raised or maintained only by breeding from birds with production *above* the average. Selection is the basis of all improvement. Do not breed from birds that have not laid well as pullets; are undersized; are less than eighteen months old; that do not conform to the breed characteristics, or that lay a large percentage of small eggs, i.e., under 2 oz.

Hatch only during the months of August and September—pullets hatched during these months should commence laying in the following March.

Other points worth remembering are that continuous culling cuts costs; hens that moult early are seldom worth keeping; late moulters (April to June) usually moult quickly and make good breeders.

The first two laying seasons are the most profitable; only birds suitable for breeding should be kept for the third or fourth year.

Feeding

A simple variety of plain wholesome foods is all that is necessary for high egg production.

Wet Mash.—Bran, 30 lb.; pollard 50 lb.; maize meal, crushed oats, or crushed barley, 10 lb.; meatmeal, 10 lb.

If cooked meat, such as bullock's or sheeps' heads, livers, &c., is used in place of the meatmeal, the mash should be mixed with the soup and approximately 2 oz. of the cooked meat given to each bird per week. If skim or separated milk is available it may be used to replace some of the meatmeal. The milk may be used to moisten the mash or may be given to the birds to drink. One gallon of milk is equal to approximately 1 lb. of meatmeal.

Dry Mash (always available in hopper).—Bran, 30 lb.; pollard, 50 lb.; maize-meal, crushed oats or crushed barley, 10 lb.; meatmeal, 10 lb. One lb. of table salt should be added to every 100 lb. of wet or dry mash.

Grain (fed in the afternoon) wheat, 60 lb., oats, 20 lb., barley or maize, 20 lb.

The following simple method of feeding has given satisfactory results in feeding tests at the State Research Farm, Werribee and should appeal to farmers. It consists of a free choice of grain and meatmeal. Wheat, oats, barley, and maize or as many of these grains as are available should be placed in separate hoppers thus being continually available to the birds. A supply of meatmeal should also be provided in another hopper and the birds are allowed free choice of these foods.

Green Foods.—Silver beet, rape, mustard, lucerne, berseem, oats, barley, maize, millet, rye grass, chou moullier, cabbage and cauliflower leaves are all good feeding as greenstuff. These should be fed in a succulent condition after the grain feed at night.

Shell-grit should always be available.

A liberal supply of pure, clean drinking water should be kept constantly before the birds.

Poultry for egg production should be given as much food as they will eat.

Food and water vessels should be maintained in a clean condition.

Housing

The object of the fowl house is to protect the birds from the weather. If fowls are allowed to roost in places where they are exposed to the weather they may keep in good health, but will not lay as many eggs in the cold winter months as when they are comfortably housed. The reason is that it takes so much of food consumed to provide for body maintenance that there is little left for egg production.

The fowl house may be constructed of any material that is durable and weather-proof. It should face either north or east and be solid at the back and ends and up to 2 ft. 6 in. from the ground at the front. The size will depend on the number of birds to be accommodated. If they are to be confined in the shed, approximately 4 square feet of floor space should be allowed for each bird.

A shed, 30 feet long by 15 feet deep, or 20 feet long by 20 feet deep, 7 ft. 6 in. high in the front and 6 feet high at the back will house 100 birds comfortably. The floor should always be a little higher than the outside ground to ensure dryness and it should be covered with 4 to 6 inches of dry straw. This litter provides exercise for the birds and when cleaned out after several months makes excellent manure for the garden. The fittings, perches, nests, feed troughs, hoppers, and water vessels should be placed about 2 feet above the floor. This provides more room, facilitates cleaning and always presents a tidy appearance.

Marketing

Eggs produced in the country districts of Victoria often have been sold for much below their true market value. The fact that some country eggs are known to be of poor quality, depreciates the value of other eggs produced there, especially those from the general farms.

With proper handling it is possible for eggs from any part of Victoria to be landed on the Melbourne market in good condition and to sell at the ruling market price for best eggs.

If good quality eggs are to be marketed, the following suggestions will be found helpful:—

Gather eggs twice a day if possible; but if this is not practicable at least once a day.

Keep eggs in a cool place.

Protect them from sun, heat, moisture, and offensive odors.

Keep eggs clean by providing clean houses, plenty of clean litter on the floor, roomy nests, and by changing nesting material frequently.

Market only clean-shelled eggs.

Never market an egg you would hesitate to boil for your own breakfast.

Market eggs at least once a week—twice a week if possible.

Be sure eggs are packed in clean dry boxes and fillers.

Summary

Start gradually with pure-bred fowls from a proved strain. Breed only from the best of your flock. Breed pullets every year to ensure a supply of eggs in the autumn and winter. Cull old birds rigidly. House comfortably and keep the birds clean. Feed plenty of plain wholesome food.

ARTIFICIAL INSEMINATION OF LIVE STOCK—*continued from page 450.*

the best possible progeny from their female stock, and so to effect a definite improvement in the average level of production of their herds or flocks, though obviously the rate of improvement will decrease as higher levels of production are reached with each successive generation. No immediate spectacular results can be expected to follow the use of artificial insemination; its value is determined by the ultimate degree of improvement which can be achieved by this method of breeding.

It is of interest to note that the number of cows enrolled for insemination in artificial insemination societies in the United States of America has increased in the four years 1939-1943 from 7,539 to 182,524, and that there is a considerable demand from other districts for heifers bred in these societies.

It must be remembered that, in using any sire for artificial insemination, both the good *and poor* characteristics of the sire will be multiplied, and for this reason the selection of the sire deserves great care. As the success of the selected sire depends ultimately on the health of the genital tract of the female to be inseminated, it is desirable that any scheme of artificial insemination should be carried out under veterinary supervision.

STRANGLES IN HORSES

By W. M. LEREW, .G.M.V.C., Veterinary Officer

STRANGLES is a highly infectious disease of horses, and is manifested by a catarrhal inflammation of the nasal passages and by enlargement and abscess formation of the adjacent lymph glands. It is due to the presence of a specific germ (*Streptococcus equi*), which may be found in the pus of the gland abscesses. It is regarded as a disease of young animals, as the greatest number of cases occur in horses between two and five years of age, although odd cases may appear at any age.

Accessory causes are teething, fatigue, chill, breaking in, and first stabling of young horses, all of which tend to lower the resistance.

The close stabling together of large numbers of horses, as on a sea voyage, or confining in an excessively warm, badly-ventilated stable, is the principal factor in the spread of the disease.

The germs abound in the nasal discharge, which will infect the drinking water and the feed, and as they may be found in the manure also, they will contaminate the bedding and prove a source of infection.

Operations, castration, &c., should not be performed on an animal while it is suffering from strangles, as the wound forms a favorable site for the growth of the germ, and may lead to the death of the patient. Healthy animals should not be operated on in premises where strangles are present.

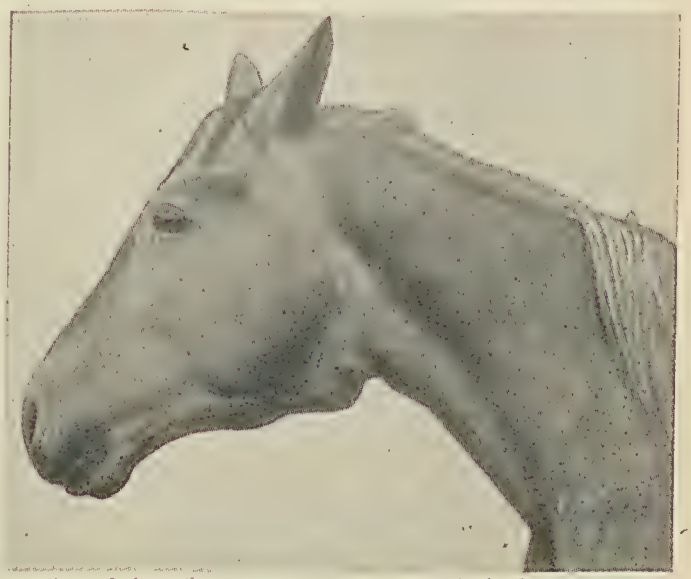
The period of incubation is from three to eight days. One attack of strangles generally gives immunity against the disease, but occasionally an animal suffers a second attack.

Symptoms.

The first symptoms noticed are dullness, the head hanging, eyes partly closed, slight stiffness, and diminished appetite. On examination, the lining membrane of the nostrils will be found to be inflamed, and this may extend to the mouth and eyes as well. The membrane, at first dry, will later give out a watery exudate, and finally a thick opaque discharge of pus, which will vary in colour from white to yellow, or may be brown from exuded blood, or greenish from food materials. This discharge generally flows from both nostrils alike. In young animals it is more profuse than in old ones.

Early in the attack the two glands situated high up in the space between the lower jaws may become enlarged and painful, and the animal then stands with the head stiffly extended. The swellings soon coalesce, and form a firm, evenly rounded, hot and tender swelling. Later a small soft spot may be felt on the surface, and this is where the abscess will burst and the pus escape. The cavity will then gradually heal up, and the recovery of the animal follows. This is the usual course of events in a mild typical case, but serious complications often occur and may result in the death of the horse.

In more serious cases the trouble may spread from the nose to the throat, causing difficulty in swallowing and a return of ingested liquids



Swelling of the submaxillary lymph glands with the first appearance of catarrhal symptoms.

[After Hutyra and Marek.]

through the nose. The extent of the swelling may threaten suffocation. The disease may be spread to the windpipe by pus from an abscess, or by nasal secretions descending into the lungs, or by inhalation of food, and bronchitis may then ensue, followed by pneumonia. Secondary infection in strangles may lead to abscess formation in the abdominal glands. If the abscess bursts into the abdominal cavity death from peritonitis will occur, but in more favorable cases the abscess will burst into the bowel and recovery may follow.

Sometimes the disease attacks the skin, particularly of the face, head, and neck, and appears as small pustules or abscesses; these usually form round the lips, nose, and eyes, or may appear on spots rubbed by the harness.

Prevention.

Prevention of strangles is a difficult matter when the disease is present in the district unless strict isolation of an animal is carried out, but certain precautions may be taken to lessen the risk. Keep young susceptible horses away from contact with strange horses; avoid public stables, and on no account allow animals to drink from public water troughs. Avoid hay or other fodder from an infected stable, and do not use harness that has been on affected horses. Before using an infected stable, thorough disinfection must be carried out.

Treatment.

In mild cases, only ordinary hygienic measures are required. Cleanliness, warmth, pure air, and easily digested nourishing food, with a plentiful supply of pure water, are the chief essentials. Rest is necessary, but exercise may be given in a sheltered yard or paddock in sunny weather. In warm weather it is advisable to keep the patient outdoors altogether instead of stabling him. If the weather is cool, the animal should be rugged. The most suitable food is grass, bran mashes, carrots, scalded oaten hay, and linseed tea. If the bowels are not acting properly two or three ounces of Glauber salts may be given daily in the drinking water.

Considerable relief will be given if the nostrils are sponged out with warm water and a little boracic acid, followed by inhalations of carbolic acid or creolin. The easiest method of giving inhalations is to fill a bucket with hot water and add a teaspoonful of the inhalant; put the bucket into a bran bag, and stand it on the ground, holding the upper end of the bag over the horse's nose. This may be continued till the steam ceases to rise from the bucket, and may be repeated several times daily. In some cases dry inhalations will be found of more benefit. For these, instead of water, place a hot brick in the bucket and pour on it a couple of teaspoonfuls of a mixture of equal parts of turpentine, eucalyptus oil, and Friar's balsam. Allow the patient to inhale the vapour three or four times daily.

Usually the affected animal is troubled with a cough, and this may be relieved by a mixture of chlorate of potash 4 oz., camphor, ½ oz., extract of belladonna, 2 oz., and treacle, 1 lb., made into a paste or electuary, and applied to the back of the tongue by means of a flat strip of wood. The dose of this electuary should be one tablespoonful three or four times a day.

If the abscess is slow in coming to a point, it may be hastened by the application of linseed meal poultices to which a little creolin has been added. This may be kept in place by a manytail bandage. If it is not convenient to apply poultices, stimulating treatment, such as rubbing with turpentine liniment, &c., or the application of a light blister, will help to bring the abscess to a head.

As soon as a soft spot can be detected a free incision with a sharp knife should be made to allow the pus to escape. If the abscess should burst before being opened, it is advisable to insert the knife and increase the size of the opening, so that the pus will have freer exit. Wash out the cavity with some antiseptic, such as a 2½ per cent. solution of creolin, or lysol (one tablespoonful to one pint of water), till the opening heals up. The fever usually subsides when the abscess has been drained. All that is required then is nursing and rest, and a complete recovery may be looked for. If any of the various complications of the disease set in, the skilled attention of a veterinary surgeon should be sought at once.

Vaccines.

Preventive and curative treatment may be carried out by a veterinary surgeon by the use of vaccines. This will prove specially valuable in the case of young thoroughbreds with important racing engagements ahead of them. Vaccination is a very wise precaution to take before shipping horses for a sea voyage.

Live Stock Notes

Compiled by
A. C. T. HEWITT, M.Agr.Sc.,
Live Stock Science Officer

Dairy Cows

The advantages of more liberal feeding of dairy cows have been demonstrated in the Morwell district this year. After the bush fires last February, dairyfarmers were advised by Mr. J. C. Donohue, Senior Lands Inspector and Chairman of the Local War Agricultural Committee to hand feed their cows and keep them in production. Mr. Donohue undertook the securing of the feed, and although the total quantities of grass-hay, bran, pollard and other feeds were inadequate to meet the demand fully, the cows undoubtedly were better fed than in previous years when they depended largely on pasturage and home-grown roughages. To spread out the limited supplies of bran and pollard that were obtained large quantities of ground wheat were purchased and fed to the cows.

Those burnt out farmers who kept their cows in production on hand-feed are in a much better position to-day than those who dried off their cows, and sent them away on agistment. These latter cows have been brought home to calve in very low condition and while away, they cost agistment fees without producing any returns. On the other hand those cows which were fed at home produced considerably more milk and cream than was necessary to pay the feed bills. They also improved in condition and are now producing top yields without any supplementary feeding.

The intake of milk to the Yinnar Dairy Products factory shows how the suppliers stuck to the job after the fires. The bulk of these suppliers kept their herds in producion after the fires and through the winter. Although some suppliers discontinued production, many of their cows were billeted on neighbours who had the facilities to milk and feed them. Despite the fires and the dry autumn which followed, the production of milk has been greater than during the previous year.

Feeding Wheat to Horses

Hay and chaff supplies have reached a dangerously low level and owners of horses and other stock will have to eke out the small quantities they are receiving to make the very meagre stocks of hay that are now left in Victoria, Southern New South Wales and Tasmania, go round.

Horse owners are finding that they can reduce their chaff requirements very considerably by feeding crushed wheat. On many farms in the drought areas, horses are being maintained solely on wheat and with controlled feeding, no ill effects are being experienced.

Horses used in towns and cities for light or heavy haulage may be fed on crushed wheat in place of a very considerable proportion of the chaff normally fed. 6 lb. of wheat has the same food value as 10 lb. of chaff and therefore only 6 lb. of wheat should be fed to replace 10 lb. of chaff. For example, if a horse were being fed 18 lb. of chaff daily it could be fed 8 lb. of chaff and 6 lb. of wheat in all. As wheat is not bulky like chaff, it is advisable to weigh the wheat to ensure that it is not overfed, other wise founder and food sickness may occur.

When feeding wheat, it is necessary to give the horses at least three feeds per day, and on no account should the full day's ration be

offered in one feed as is apt to occur over week-ends. If this is necessary, chaff or hay should be left out for the horses.

Crushed wheat should not be fed alone as it is apt to run together in the stomach when mixed with saliva and digestive juices. At least 1 lb. of chaff should be mixed with every 4 lb. of crushed wheat. Crushed wheat should be fed in preference to whole wheat, but in areas where wheat is grown and available, and where crushers are not available, whole wheat could be used. Crushed wheat, which has had the flour and finer particles sieved out, such as is offered by some flour mills and known as the "first break," would be the best for feeding to horses.

When large quantities of wheat are to be fed for a considerable length of time, 1 lb. to 2 lb. of lime should be mixed with every 100 lb. of crushed wheat to counteract the deficiency of calcium in the wheat grain.

Some suitable daily rations for stall fed horses are shown in the following table. These daily rations should be fed in at least three feeds to idle horses and horses doing light work —one-third in the morning, one-third at noon and one-third in the evening, and in at least four feeds to horses doing medium to heavy work, receiving one quarter of the ration at each feed with the fourth feed late in the evening.

Work.	Light Horse (1,000 lb. Live Weight).		Medium Horse (1,200 lb. Live Weight).		Heavy Horse 1,400 lb. Live Weight).	
	Chaff.	Crushed Wheat.	Chaff.	Crushed Wheat.	Chaff.	Crushed Wheat.
	lb.	lb.	lb.	lb.	lb.	lb.
1. Where Moderate Supplies of Chaff are Available.						
Idle ..	7	6	8	7½	8	10
Light ..	8	9	8	10½	8	13
Medium	8	11½	8	14	11	15
Heavy	8	15	12	15	16	15
2. Where only Scant Supplies of Chaff are Available.						
Idle ..	4	8	4	9½	4	12
Light ..	4	11	5	12½	5	15
Medium	5	14	6	15	11	15
Heavy	8	15	12	15	16	15

The above rations may not satisfy the horses' appetites as there is insufficient bulk to fill their stomachs, but more should be fed only when the owner is satisfied that the animals are losing condition or doing heavier work than was originally intended.

The tables have been based on the assumption that the maximum quantity of wheat it is advisable to feed a horse is 15 lb. per day, in at least three feeds.

Very few horses do heavy work. The majority of working horses are doing light to medium work. Sizes of horses are also misleading. Most delivery horses are between 1,000 and 1,200 lb. live weight, while most draught horses on farms are between 1,200 and 1,400 lb. live weight.

In the above rations crushed wheat is included to replace the oats usually fed, as well as portion of the chaff, since oats are also unprocurable. When feeding crushed wheat to replace oats, the same measure should not be fed as wheat is very much heavier than oats. For instance, a gallon tin of wheat weighs 7½ lb. in comparison to 5 lb. only for oats. The crushed wheat should be weighed and the measure adjusted accordingly.

The above rations would be greatly improved if portion of the wheat could be replaced by oats or crushed barley. The rations are full rations, and can be reduced where some grazing is available.

Potatoes as Pig Food

Potatoes which are wholesome but, for various reasons, unsuitable for human consumption, may form a large part of the diet of pigs, resulting in fast growth and good carcass quality, but as pig feeding is as much a matter of economics as of nutrition, potatoes should be fed to pigs only when they are available at a price favourably related to the prices of pigs and of other pig foods.

Many pig feeding experiments, mostly in other countries, have demonstrated that four tons of potatoes when boiled or steamed, are equal to 1 ton of cereal meal, but if the potatoes are fed raw, 6 tons are required to replace 1 ton of cereal meal. These replacement values only apply when the potatoes are fed in balanced rations. On these values, if wheat can be delivered to the piggery and crushed, at a total cost of 4s. per bushel, potatoes are worth aproximately £1 10s 0d. per ton at the piggery ready for boiling.

When it is desired to feed the maximum quantity of potatoes consistent with good growth, young pigs should be fed their usual diet of cereal meal and either separated milk or meat-meal until they are about 60 lb. live weight, and then, continuing with the same quantities of those foods, cooked potatoes

should be introduced to the diet and fed in increasing quantities to satisfy the appetites of the pigs as they grow to baconer weights.

For brood sows, approximately half the cereal allowance may be replaced by potatoes.

Potatoes should be boiled with the least possible quantity of added water, and the pigs should be allowed water to drink separately from their food.

[L. A. Downey, H.D.A., Pig Expert.]

Collect Eggs Regularly

The poultry farmer conducts his farm for the purpose of egg production and all the duties of feeding and breeding revolve around this factor, yet, strangely enough, when the egg is finally produced by the fowl it is not always given the attention it deserves. For example, eggs are frequently left lying in the nests longer than is necessary and sometimes on the floors of the pens, where quite a number become broken and soiled. A broken egg represents a loss of approximately 1½d. and a soiled egg involves the extra labour of cleaning. If the value of the egg in actual cash were lying around the pens it is safe to say it would not remain there for long.

The system of nesting should be one that will encourage the birds to lay in the nest rather than on the floor. Nests, too exposed or in any way uninviting to the birds, should not be used. Hens prefer a dark secluded place in which to lay their eggs. Provide the type of nest that the birds will use readily and have it dark enough to discourage the hens loitering in them after the eggs have been laid.

[M. D. Hall, Assistant Poultry Expert.]

Bees

Under normal conditions the month of October is associated with swarm control and queen rearing. The steady flow of nectar and heavy yield of pollen from the Cape weed blossom, combined with rising temperatures, form ideal conditions for breeding.

However the Northern areas and parts of the Central, Wimmera and North-eastern districts are faced with drought and immediate seasonal rains are necessary for the growth of Cape weed. Few eucalypts in these areas will bloom before December, and the present indications point to a serious lack of pollen and nectar which are necessary for the breeding of young bees to replace those forming the colonies during the winter, and now approaching the end of their existence. Under these conditions migration is the only satisfactory solution to the problem and quite a number of commercial apiaries have already moved their bees to the coastal areas where conditions are more favourable. Such colonies, moved to the Mornington Peninsula and inspected recently appear to be thriving.

Throughout Gippsland bees are in good order and are breeding well.

Encouraging reports of experiments conducted in America with a pollen substitute have been noted. The material used, Soya bean flour made by the expeller process (a process which reduces the fat content of the bean to negligible proportions prior to crushing) and mixed with 25 per cent. of natural pollen has given the best results to date. The pollen used in the experiment was secured by the use of pollen traps placed at the hive entrance. It is estimated that sufficient surplus pollen could be secured from one hive during a heavy yield to supply the needs of twenty-five when mixed with Soya bean flour.

[J. W. Thomlinson, Apiary Inspector.]

War Agricultural Committee Notes

Compiled by the Central Executive

Victorian Production Goals, 1944-45

AUSTRALIA'S commitments to supply food to the Allied nations are still increasing, and every endeavour must be made to meet them. Even a small increase in the production of every farm in this State will materially assist in the fulfilment of our obligations.

In order that farmers may direct their efforts to those forms of production which are most urgently needed, the Commonwealth Government has indicated its requirements by setting production goals.

In the accompanying table the production goals which have been allocated to Victoria for the 1944-45 season are shown in comparison with those set for 1943-44 and with the actual production during 1942-43 and 1943-44. It will be seen from this table that increased production is required in most of the commodities produced in this State.

Of the main commodities listed, dairy production is perhaps the most important and, although an increase of only 5 per cent. over the production during 1943-44 has been asked

Commodity.	Average Production Five Years, 1938–39 to 1943–44.	Production 1942–43.	Production Goal, 1943–44.	Production 1943–44.	Production Goal, 1944–45.
1. Dairy Products—	Tons	Tons	Tons	Tons	Tons
Butter	62,619	54,686	55,000	48,817	..
Cheese	9,802	11,183	13,000	11,858	..
Powdered Milk ..	8,215	11,203	15,300	11,917	..
Condensed Milk ..	21,936	30,922	37,200	32,974	..
Total Manufactured Products	1,000 Gallons 366,167	1,000 Gallons 340,128	1,000 Gallons 346,400	1,000 Gallons 314,671	1,000 Gallons 330,000
Whole Milk for consumption as such ..	..	..	54,000	..	55,000
2. Meats—	Tons	Tons	Tons	Tons	Tons
Beef and Veal ..	..	118,000	..	108,000	..
Mutton and Lamb	..	160,000	..	160,000	..
Pig Meats ..	..	23,000	..	30,000	..
3. Dried Vine Fruits	51,200	54,200	57,000	58,700	56,500
4. Eggs	Dozen 18,463,853	Dozen 20,001,975	Dozen 24,500,000	Dozen 23,306,166	Dozen 26,000,000
	Acres	Acres	Acres	Acres	Acres
5. Potatoes	39,140	51,540	64,000	77,000	94,000
6. Flax	13,432	26,000	31,900	31,612	42,000
7. Navy Beans ..	..	3,500	7,500	2,100	Not yet set
8. Broom Millett ..	670	488	No goal set	887	900
9. Tomatoes.. ..	..	3,800	5,200	5,750	Tentative Goal 5,200
	1,000,000 Lb.	1,000,000 Lb.	1,000,000 Lb.	1,000,000 Lb.	
10. Tobacco	1·25	1·02	1·75	1·95	2,300 acres
	Bushels	Bushels	Bushels	Bushels	Bushels
11. Barley	2,532,529	1,273,704	2,200,000	1,078,128	2,680,000
12. Wheat	33,087,466	41,803,107	23,000,000	19,733,322	2,400,000 acres
13. Canned Fruits—	1,000 Cases	1,000 Cases		1,000 Cases	
Apriots	146	122		182	
Peaches	1,046	825		1,038	
Pears	572	590		501	

for, every additional gallon of milk which can be produced is urgently required. The 1943-44 production was the lowest on record for the past 10 years and was 7 per cent. below that for the previous year. Apart from the effect of the adverse season, this decline in production has been attributed to many causes, not the least among which is the shortage of man power. However, in this State 1,400 men have now been released from the services and industry to return to dairying, and it is hoped that the assistance of these men will result in a substantially increased production.

The production goal for meats has been set for the calendar year 1944 only.

It is gratifying to note that egg production during 1943-44 showed an increase of 16 per cent. on that of the previous year. Nevertheless, a further increase of 12 per cent. is required to meet the demands for 1944-45.

A substantial increase in the acreage sown to potatoes has been asked for again this year. Should this goal be met in full, Victoria will have trebled the area sown to this crop in 1941-42.

From these brief comments it will be seen that in the coming season an extra effort is again sought from the farmers of this State. In spite of the unfavourable opening of this season, the Department of Agriculture feels sure that every endeavour will be made to fulfill these urgent requests.

Accredited Brucellosis-free Herds (Swine)

The following herds of pigs have been accredited as free of swine brucellosis (contagious abortion of pigs) by the Department of Agriculture.

An accredited brucellosis-free herd of pigs is one in which all animals therein have been subjected to two successive blood tests for brucellosis with negative results at intervals prescribed by the Chief Veterinary Inspector of the Department.

In order to remain accredited, a semi-annual or annual re-test (as determined by the Chief Veterinary Inspector) of all animals in the herd shall be conducted. If at a re-test any animal fails to give a negative reaction to the test, the herd shall not be declared brucellosis-free again until two tests of the complete herd have been carried out with negative results.

Full particulars of the Accredited Swine Brucellosis-free Herd Scheme and application forms may be obtained from the Chief Veterinary Inspector, Department of Agriculture, Melbourne, C.2.

Name.	Address.	Name.	Address.
Abrahams, L. J. ..	Red Hill South	Hawtin, I. E. and F. ..	"Rossmoyne," Colac
Baker, J. J.	Bannockburn	Haywood, Dr. A. R. ..	Hastings
Beechy, K.	Pomborneit	Horn, L. A.	Leongatha North
Bidgood Bros.	Staghorn Flat	Longerenong College ..	Dooen
Bodey, A. A.	"Bonnyview," Dooen	Noble, T. M., and Sons ..	Maffra
Bright, George H.	Dumbalk	Northcote Children's Farm	Bacchus Marsh
Buller, R. A.	Beaconsfield	Rintoul, J. T. C. ..	Glengarry
Castle, L. H.	Clarinda	Roy, W. A.	Morrell's Hill, via Boolarra
Critten, H. S.	Dumbalk	State Experiment Farm	Rutherglen
Dookie Agricultural College	Dookie	Trenery and Soderlund ..	"Promview," Foster
Doornbusch, John L. ..	"Starpark," Nhill	Trigg, A. J.	Bungaree
Ellwood, A. H. ..	Paschendaele	Trigg, N. H.	Bullarook
Fairchild and Clutterbuck	Tinamba	Tweddle, J. T.	"Winlaton," Shepparton
Hamblin, A. T., and Sons	Toolleen	Warry, A., and Sons ..	Delburn
Harrison, C. T. ..	"Eastside" Stud, Pomborneit	Whelpton, B.	Whittlesea North
		White, G. W.	Boolarra South

Caseous Lymphadenitis (*Cheesy Gland*) of Sheep

Compiled by The Veterinary Staff

UNTIL recently many sheep owners have wondered why they were urged to adopt precautionary measures to eradicate the disease known as caseous lymphadenitis, or as it is more commonly called, cheesy gland, especially as sheep usually show no ill effects as a result of infection. It must be realized, however, that no lamb or mutton carcass which shows the slightest trace of cheesy gland will be accepted for consumption in Great Britain; hence no carcass can be passed for export unless entirely free of the disease.

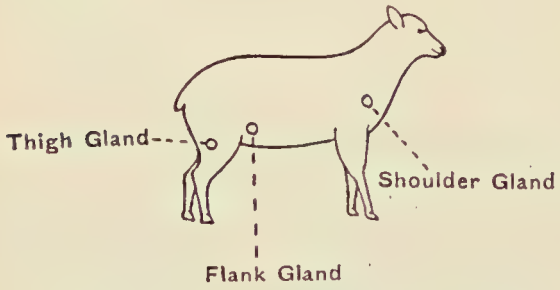


Fig. 1—Sketch of sheep showing lymphatic glands most commonly affected with caseous lymphadenitis.
[Dept. Agric., N.S.W.

Cause and Nature

The disease, which is essentially a chronic one, is caused by the bacillus known as *Corynebacterium ovis*. On entering the body of the sheep, the bacilli are caught up in one or more of the lymph glands or "kernels" which occur in various parts of the body. The lymph gland affected is usually that nearest the point of entry of the causative agent. The affected gland increases in size as the microbes in it multiply, due to the formation of a pus which is usually greenish in colour. The tendency is for this pus to become converted into a cheesy material. Hence, to be able to readily recognize the disease, one should know the appearance of both the pus and the cheesy material. The latter tends to have less of a green hue.

If one of the lymph glands situated just beneath the skin (see Fig. 1) becomes affected there is a tendency for the abscess in it to burst and discharge on to the body surface, where it mats the wool. This discharge is a prolific source of infection as the wool protects it from the action of the sun's rays, and at shearing time the matter may be transferred from one sheep to a cut on another by the shears, the combs or even the clothes of the shearer. A certain amount of skill is required to feel these glands easily by hand, but once that skill has been acquired it is relatively simple to differentiate a normal from an enlarged gland.

The only signs of the disease in affected sheep are the swollen superficial body glands, and, of course, these are noticed only in those sheep in which the superficial glands happen to be affected. It is possible for a sheep to have a large cheesy gland abscess in its chest cavity and yet, apparently, be perfectly healthy.

Means of Infection

For an infection to be set up in a sheep's body the causal organism (*Corynebacterium ovis*) must go directly into the tissues. For example, it is most unlikely that sheep ever become infected by eating the organisms,

Fig. 2—Lymphatic gland, showing abscess.
[Dept. Agric., N.S.W.

Fig. 3—Enlarged shoulder gland almost ready to burst. Note shedding of wool over abscess.

[Dept. Agric., N.S.W.

unless there are wounds in the mouth cavity, or elsewhere in the digestive tract, in which case there is no hindrance to direct tissue entry.

During a sheep's life various wounds are inflicted on it, and through any of these infection may take place. Consider marking wounds first. These consist of ear-marking, docking, and castration. The most usually contaminated of these three wounds is that caused by castration, especially if the lamb is not placed on the ground carefully when marking is finished. The docking wound comes next in order of probability of infection and the ear-marking wound last. However, neither of the latter two are very likely sources of infection. But, if marking is carried out year after year in the same yards, the ground is likely to become heavily contaminated with the germ of cheesy gland and the risk of infection of all three wounds naturally increases. Hence it is most important to mark lambs in temporary yards on fresh ground each year. This is a sound practice for the prevention of other diseases as well, and is one of the hall marks of good sheep husbandry.

Now, to consider what is recognized as the most prolific source of infection—the shearing shed and its surroundings. Mention has already been made of swollen infected superficial lymph glands and the discharge which frequently results from these. It is inevitable that sheep will be wounded while being shorn, and it will easily be seen how the combs will become infected from the discharge of a suppurating abscess on one sheep, and then this infective discharge will be conveyed into the tissues of another sheep which is wounded while being shorn soon afterwards. Again, the discharge from a burst abscess—especially in a shoulder gland—may accidentally be rubbed on to the shearer's pants and then when the next sheep is being shorn and is perhaps wounded the tissues will become infected from this discharge.

If the counting-out yards are contaminated with cheesy gland abscess discharges it is likely that shearing wounds will become infected if sheep lie down in these yards, or if they fall after coming down the chute from the shed to the yard; also if the yards are dusty and the day windy the organisms can easily be blown about with the dust and lodge on a wound and start the disease in that particular sheep. What has been said of shearing wounds applies in the main to crutching wounds which may become contaminated.

The fact that the channels of infection just described are the principal ones is undoubtedly true. But what is the explanation of infection in lambs which have neither been shorn

Fig. 4—Ewe showing abscess in udder and in gland adjacent to udder.

Dept. Agric., N.S.W.

nor marked? First of all, it must be stated that the percentage of such infection is extremely low, and there are various explanations for it. For instance, when the lymph gland, which is found above and behind the ewe's udder, is infected it is quite possible for the lamb to take the causative organism into its mouth when sucking, and then the organism finds its way into the tissues via a small mouth wound. If any of the other superficial lymph glands of the ewe are discharging, the lamb will obviously always be prone to infection while running with its mother.

It may well be asked to what extent contamination of pastures is a source of infection. The fact that infection does not enter lambs via navel wounds to any extent shows that pasture contamination is apparently a small factor in infection. Experimentally it is quite easy to infect lambs via the navel merely by swabbing it with a small amount of culture or pus.

Prevention

Prevention is all important as there is no known cure for this disease. The best way to approach the question of prevention is to consider the means of infection and then adopt appropriate counter measures.

Markings.—The use of temporary yards on fresh ground cannot be urged too strongly. It is of paramount importance. When marking is finished put the lamb carefully on its feet. On properties where infection is heavy, consideration must be given to the bloodless methods of castration and docking. Knives, pliers, &c., used in marking must be kept clean by immersion in disinfectant after each lamb (1 teaspoonful of lysol to 1 pint of water).

Shearing.—The shed must be cleaned thoroughly before shearing starts each year. A good method is to scrub it with hot water and soda, and then wash it thoroughly with carbolic acid or phenol or some other reliable disinfectant solution. Clean chutes and counting-out pens are necessary. Pens under the shearing shed are unwise, as they are so difficult to clean and the sun's rays cannot reach them. It is wise to remove the surface soil of the counting-out pens and replace it with fresh clean soil, which should be dampened so that dust will be reduced to a minimum. Some owners have adopted the very wise course of concreting the counting-out pens. This ensures absence of dust and facilitates cleaning. It must be obvious to sheep owners that by adopting these precautionary measures they are also helping to protect their sheep against other diseases, such as tetanus and maligant oedema.

Fig. 5—Showing enlarged flank gland.
[Dept. Agric., N.S.W.

If, when the sheep are brought in to be shorn, any are noticed with swollen or burst glands, they should be put to one side and shorn last. Crowding and bustling sheep will increase the likelihood of swollen glands bursting and discharging and of this discharge contaminating other sheep. Wherever possible, lambs should be shorn first to lessen the risk of infection via shearing wounds.

It is a wise procedure, especially in a stud, to handle all the sheep once a year, and to cull or at least isolate any which show swollen glands. This may be impracticable on large runs, but should be done wherever possible. Any stud sheep purchased should be examined thoroughly before being placed with the flock. It is much easier to pick up enlarged glands in freshly-shorn sheep, therefore they should be gone over soon after they have been shorn.

An ideal course to follow would be to clean combs, cutters, and shear blades after each sheep. The difficulties are realized, but it should be possible to do this on small studs, and it should certainly be done on any property after a case of cheesy gland has been shorn. The method is to remove all grease from combs, &c., and then thoroughly immerse them in 2 per cent. soda or 3 per cent. lysol.

If shearers' clothes become soiled with matter from an abscess they should be changed.

On properties which show a large percentage of infected cases it is wise to dip the sheep off shears with a non-poisonous—*not arsenical*—dip.

IN THE ORCHARD

Contributed by the Horticultural Division

Codling Moth

EXPERIENCES of fruit growers concerning the damage by codling moth to their apple and pear crops last season, were varied. Generally speaking, apple and pear growers in the metropolitan areas suffered a less than normal loss from this pest. On the other hand some pear growers in the Goulburn Valley had severe losses. Observations indicate that there are wide variations in the amount of infestation on various orchards and where losses by some growers extended to half their crop, others in the same locality had negligible damage. Those with a high percentage of infestation generally admit that methods of attack by spraying and sanitation were below standard, perhaps for reasons outside their control, such as insufficient skilled labour or equipment. Some however, maintain that despite all their efforts which were of a high standard, the codling moth was not controlled. The fact remains that many growers can still secure control, and there does not appear to be any adequate reason why this should not be the experience of all. This can be achieved by using all the means available to reduce the population of over-wintering grubs by sanitation and thorough spraying to protect the fruit.

The first, and one of the most important sprays is the one known as the "calyx spray." The calyx or the small cup at the flower end of the apples and pears is a favourite point for attack by the codling grub. In apples the opening to the calyx closes over soon after the petals fall, so that the time available to fill this cup with a protective coating of lead arsenate is limited to a few days. "Petal Fall" for all the flowers on most varieties of apples may extend over eight to ten days. To make sure that each calyx is properly protected, it is necessary to apply two calyx sprays, one being applied when 80 per cent. of the petals have fallen and another eight days later.

Petal fall occurs earlier in pears than in apples and except in the warmer inland districts, where moths may become active earlier, the calyx spray may be delayed for two or three weeks. In the Goulburn Valley and other northern areas the first calyx spray for W.B.C. pears should be applied at petal fall. This is one of the most important sprays in pears and the job should be done as thoroughly as possible. For preference use long rods with the nozzle pointing downwards so that the spray can be directed into the calyx cups. Spray guns are unsuitable for this work.

If the work is being carried out by casual labour, inspect the calyces from top to bottom on branches selected at random. If any improvement in the technique of spraying is indicated, the operator should be advised accordingly. For all calyx stage lead arsenate sprays for codling moth control, use 6 lb. paste or 3 lb. powder in 100 gallons of water. The use of spreader is not recommended unless a combination lead arsenate-lime sulphur spray is used for codling moth and black spot in apples. In this case, dilute the lime sulphur in the vat and add half a pound of lime-casein spreader or 2 lb. "Limil" before adding the lead arsenate.

Remember that a thorough job of spraying done in the spring will save a lot of trouble later on by reducing the number of grubs surviving from the spring brood.

Why the Emphasis on Nitrogen?

Fruit growers may be puzzled by the fact that when artificial fertilizers suitable for fruit trees are being discussed, those containing nitrogen are recommended as providing the most profitable investment. Fertilizer trials conducted on fruit trees in this State have shown no increases in yield from potash or phosphates, while fertilizers containing nitrogen have, after a period of years, produced increased yields. Why should phosphates be so important for pastures and vegetable

Using a spray rod for the calyx spray on pear trees.

crops and yet apparently be of such little direct benefit to fruit trees? Perhaps the experiments have not been in progress long enough to produce any positive results, although some have been carried on for eight years and more. On the other hand there is abundant evidence from overseas that both potash and phosphates are relatively unimportant as fertilizers for orchards.

Do fruit trees require potash and phosphate, or does the soil normally contain sufficient for the needs of the tree? The fact that these two substances are essential for health of the trees has been amply demonstrated by the sand culture experiments with apples, pears, and peaches, conducted by this Department. Where potash was withheld, the leaves became smaller than usual and scorched at the edges. The fruit was abundant but small, dull-coloured and lacking in flavour. Absence of phosphates was indicated by small dark green leaves growing in a rosette, shoot growth was severely restricted and fruit, although of bright colour was small and of poor quality. After two or three years, fruiting ceased. The early defects of root-borer attack are very similar to phosphate deficiency symptoms.

However, symptoms of phosphate deficiency have not shown up on Victorian orchards, and symptoms of potash deficiency only under exceptional circumstances. It appears therefore that there is sufficient phosphate and potash in orchard soils for adequate nutrition of the trees. Actually the amount of phosphate and potash removed by the fruit is very small. Loss from prunings is negligible because the minerals are usually returned to the soil in the ash after burning. An apple tree producing an average of three bushels per year, in twenty years would lose $\frac{3}{4}$ lb. phosphoric acid and $4\frac{3}{4}$ lb. potash in the fruit.

The roots of a tree feed in a volume of soil of approximately 1,200 cubic feet, weighing 40 tons. An analysis of an orchard soil at Croydon reveals 42 lb. phosphoric acid and 100 lb. potash in this quantity of soil. These figures are low, but would be representative of this area. The potash content of a similar volume of Goulburn Valley soils is in the vicinity of 300 lb. Because of the vast area of root surface feeding in this quantity of soil, the actual proportion of these substances in the soil solution would not need to be very great to supply the annual requirements of the tree. Although there probably is a sufficient quantity of these elements for the trees' requirements, it has yet to be definitely proved that applications of either or both may have some effect on such things as quality and colour. However, the fact that applications of both potash and phosphates are rapidly locked up in the clays in the surface layers of the soil above the root zone of the trees, would mean that large quantities would have to be applied to achieve any result.

Superphosphate has, of course, some value in orchards in that it is a necessary source of readily available phosphate for a crop of green manure and is thus of indirect benefit to the trees.

IN THE GARDEN

By J. L. PROVAN, B.Agr.Sc., Principal, School of Horticulture, Burnley Gardens

Transplanting Seedlings

Many seedlings which have been raised in seed boxes, seed beds, or purchased in bundles from seed shops, will be transplanted this month; particularly more tender types like *Petunia, Salvia, Zinnia,* &c. When transplanting, it is a very good practice to retain as much of the soil on the roots as possible, and to plant into a well prepared bed. The soil in this bed should be broken down to a fine tilth, particularly where the seedlings are to be planted. Seedlings which are moved with the least disturbance of the root system will establish themselves in their new situation in a much shorter time than those whose roots have been disturbed by the soil being shaken from them. If seedlings are rather dry and wilted, it is a good plan to soak them well with water beforehand, and plant in the late afternoon or evening. In fact, all transplanting is best done in the late afternoon, and if a cloudy, cool day is chosen the results will be better than if transplanting is done on hot, windy days.

Bare-rooted seedlings should be planted by means of a dibber, and the roots placed in the bottom of the hole and the soil then knocked in on top of them, leaving a slight depression near the surface which can be filled with water.

Do not ram the soil down on the roots, but fill the depression with water and let it soak down through the soil and over the roots. This is a much better practice than that which is often advocated, namely, to place the roots of the seedling on one side of the dibber hole and make another hole alongside with the dibber, and press the soil against the plant. In the latter method, in many cases, the water seldom soaks across to the seedling and many "misses" occur through the drying out of the plant.

Hard, stocky seedlings will always transplant and grow better than tall, weak, spindly seedlings which are frequently soft. Before commencing transplanting operations, the bed should be thoroughly soaked about a day or two before planting is to take place. This is best done by watering with a fine, misty spray for a long period. The small depression mentioned above should be left near the seedling for several days, so that subsequent waterings will fill the depression and ensure that the plant will be kept moist. If hot weather occurs soon after transplanting, some shade should be provided for the young seedlings. A large flower pot inverted over the seedling will provide some protection, or small prunings from shrubs, stuck in the ground by the seedlings to cause a partial shade, will also be useful.

It is very important that seedlings should be spaced at the correct distances apart. For example, the giant tall-flowered Zinnias should be spaced 18 inches to 2 feet apart, while the dwarf types, such as the *Lilliput, Linearis* and *Haageana* require to be planted 8 inches to 1 foot apart. Asters can be planted about 1 foot apart; *"Bonfire" Salvia* planted in rows 18 inches apart, with 15 inches between the plants, while the dwarf types of Salvia such as *Rocket* and *Harbinger,* should be planted about 10 inches apart, *Phlox Drummondii,* 9 inches apart; bedding Petunias 12 inches apart, and the large fancy types of Petunias 15 inches apart. The large flowered African types of Marigolds should be spaced 18 inches to 2 feet apart, and generally these plants also require light stakes. Smaller types of Marigolds such as the French Marigold, should be spaced according to the heights to which they grow and the spread of the plant. The dwarf types may be spaced 10 inches apart, the medium types which grow to a height of about 2 inches—15 to 18 inches apart, and the tall types, similar to the tree Marigold, which grow to a height of about 4 feet, require a spacing of about 2 feet between plants.

IN THE VEGETABLE GARDEN

Cabbage

Seed of *Early Jersey Wakefield, Henderson's Succession,* and *Aphis Proof* cabbages may be sown this month in seed boxes or seed beds. Cover the seed with about ¼ inch of sandy soil. Towards the end of the month, plants of these varieties may be transplanted to their permanent beds. This does not mean that these particular seedlings will be ready in that time, but if seedlings are purchased, these varieties should be chosen for transplanting at the end of the month.

Broccoli and Brussels Sprouts

Green Sprouting and *Late White* Broccoli seed may be sown this month and *Fillbasket* and *Covent Garden* Brussels Sprouts seed can also be sown towards the end of the month.

Silver Beet

Silver Beet seedlings may be planted. Space the rows 18 inches to 2 feet and the plants about 12 inches in the rows.

Lettuce

Lettuce is a very important summer crop, and continuous sowing should be made at monthly intervals to ensure a succession of this valuable salad vegetable. At this time of the year *Imperial* 847 and *Iceberg* are good varieties to sow. Sow the seed in seed boxes or seed beds and cover with not more than ½ an inch of fine sandy soil. Do not make the mistake of sowing the seed too thickly, otherwise the development of the young seedlings will be retarded and they will be weak and spindly at transplanting time. Good sturdy seedlings which have been quickly grown and which can be lifted with soil on the roots will survive the transplanting operation much better and will come to maturity quickly. Many lettuces fail in the home garden because they receive checks due to crowded seed beds, or to the transplanting of weak seedling plants. For successful lettuce growing, it is essential to keep the plants growing quickly. A rich fertile soil and regular watering is essential. Nitrogenous manures should be applied frequently and a good plan is to use 1 ounce of sulphate of ammonia or nitrate of soda, in a gallon of water and apply this every fortnight or three weeks. Do not allow this solution to touch the leaves, otherwise it may cause injury to them.

[*Continued on page* 468.

SPAYING OF ANIMALS

By W. D. SHEW, G.M.V.C., B.V.Sc., Senior Veterinary Officer

THE operation, commonly spoken of as spaying, consists of the removal by surgical measures of the ovaries of female animals. This unsexing, when the ovaries are healthy, is described technically as "oophorectomy"; when the operation is performed because of disease in the organs it is spoken of as "ovariotomy".

Spaying is practiced on all domestic animals. Mares are spayed generally to overcome faulty or vicious habits, such as kicking or biting, or because of uncertainty of temperament. Cows and heifers are so treated when it is desired to lengthen the lactation period and to hasten fattening and improve the quality of the beef; the meat from a spayed heifer is supposed to be as good as that of a steer. Sows too, are sometimes spayed so that they may be fattened quickly, and bitches and cats are operated on to prevent them from becoming a nuisance. The domestic fowl may be spayed in order to enhance her value for the table.

Spaying of Cattle

Heifers may be spayed to limit numbers of a herd without culling; such animals fatten more quickly and grow faster than those not operated on. They are also quieter and cause less disturbance in the herd.

Cattle may be spayed from the age of six weeks, at almost any time of the year and whether they are fat or poor. It is advisable, however, to wait for suitable weather conditions, and if exterior methods (flank or ventral) are adopted, the operation should be performed when the weather is cool and when the pastures are green and flies not troublesome.

Methods.

There are three methods of spaying:—(1) the flank method; (2) through the vagina; and (3) through the under surface of the abdomen or belly in front of the udder. (The latter method is adopted only for calves or other small animals.)

Equipment Required.

(1) Spaying emasculator.
(2) Sharp knife.
(3) Clippers or curved scissors to remove hair.
(4) Some strong half curved needles.
(5) Pair of needle-holders.
(6) Strong suture silk or strong gut in reel.
(7) Pair of artery forceps.
(8) Roll of absorbent cotton wool.
(9) Bottle of antiseptic (Dettol, Lysol, Monsol, Sterelin or similar preparation).
(10) Bottle of methylated spirits or tincture of iodine (to paint skin prior to incision).
(11) Cake of good soap and towel.
(12) Clean buckets with supplies of warm water for cleansing hands, &c.

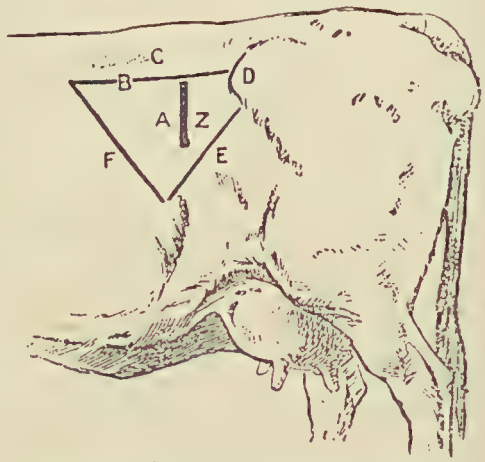


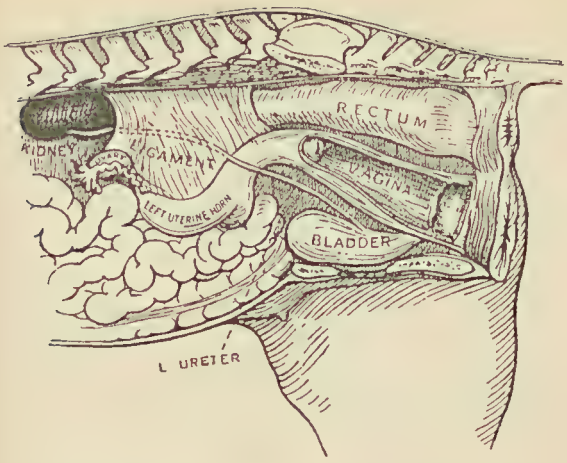
Diagram showing the site for the spaying operation.

F is last rib; D, hip bone; Z, line of incision; B, C, and E, muscle fibres; the area A consists of abdominal muscles.

The Flank Operation

All instruments should be sterilized in boiling water for ten minutes prior to use. When not in use they should be kept in a solution containing 5 per cent. Lysol, Monsol, Dettol, Sterelin, or some similar antiseptic.

The operator's hands must be thoroughly cleansed by scrubbing with soap in an antiseptic solution containing any of the preparations just mentioned at a strength of 1 per cent. Between operations also the hands should be cleansed in the solution.



Showing the position of the genital organs.
[After Wooldridge.

The flank method is probably the easiest and the one most commonly followed by laymen. The animal should be placed in a crush. On some properties crushes have been specially built for spaying. The main objective is to keep the animal as still as possible while leaving the place of operation easily accessible, and as it is essential that she should be in a standing position, rails should be placed under her to prevent her lying down. On the gate side (if only one gate is used) there should be a small trap-door through which the operator may work. The operation can be performed on either the left or right side, but for several anatomical reasons it is preferable that it be done on the left side.

The site for the operation is in the abdominal wall between the last rib and the point of the hip (see diagram). It is preferable to clip the hair and the area should be thoroughly washed with antiseptic solution, dried with clean cotton wool and painted with either methylated spirits or with tincture of iodine.

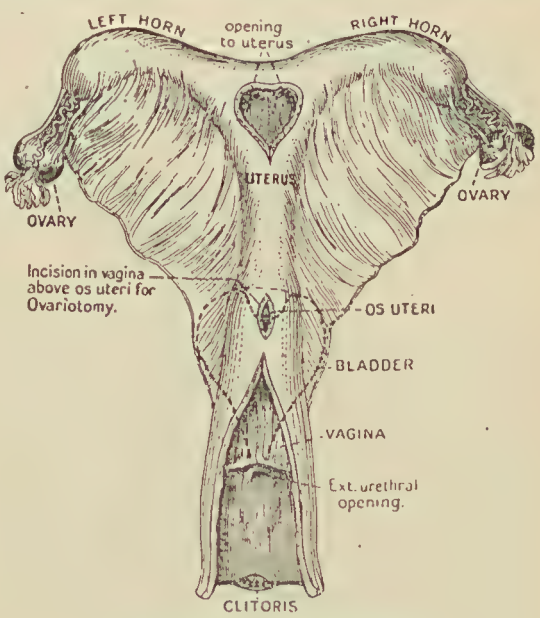
An incision is then made, usually 3½ to 4 inches long in a downward direction. The skin having been cut through, the fibres of the outer muscle are exposed; these can then be divided with the knife or the fingers. When the muscle has been divided, the fibres of the next muscle running in an opposite direction are likewise divided.

The peritoneum or lining of the abdomen or bowel cavity is now revealed and when divided shows in the opening the rumen or first stomach wall. The peritoneum can be recognized by its shining appearance. The hand is then inserted and the right ovary (if operation is on the left side) is sought. The ovaries are usually oval shaped and vary in size with the age of the animal. In calves they are about the size of a pea; in two-year-old heifers about the size of a broad bean, while in old cows they may be as large as a bantam's egg. Should an ovary be cystic it will be larger than normal, and may be very much enlarged if diseased. From the illustration it will be seen that one ovary is attached to the right horn of the uterus and the other to the left horn.

When with one hand the operator has grasped an ovary, the emasculator should be inserted with the other hand and each ovary carefully removed. The incision is then stitched with several strong stitches which should be interrupted, i.e., each stitch should be separate. Sometimes a continuous thread is used, as when bags are being sown; this should not be done. The stitches should be dressed with collodion, or if a cheap dressing is required, Stockholm tar may be used. No further treatment will then be required, except the removal of the stitches when the wound heals.

The Vaginal Operation

This method has many advantages and is the one almost always adopted by a veterinarian when operating on adult cattle. If no crush



The vagina, uterus and ovaries.
[After Wooldridge.

is available an ordinary bail is quite satisfactory and is all that is required for dairy cows.

The equipment already mentioned is all that is necessary except for the addition of a special spaying knife having a concealed blade, which is not opened till in the vagina just prior to the incision being made. (The suture material, such as needles, silk, methylated spirit, &c., will not be required.)

Cows, especially dairy cows, should be first examined to ascertain if there is any abnormality such as a discharge from the uterus or from the vulva, or any sign of vaginitis. If all is apparently normal the vagina should not be washed out, but the anus, vulva and buttocks should be well cleansed with a 5 per cent. antiseptic solution as already recommended for the disinfection of instruments.

The hands having been thoroughly cleansed the operator should insert a hand into the vagina with the special knife concealed in the palm. Two or three inches about the mouth of the womb an incision about an inch long should be made through the vaginal wall and also through the peritoneum, as otherwise the ovaries cannot be reached. After the knife has been removed from the vagina the fingers should be inserted through the wound opening and the ovary felt for; this is generally withdrawn through the opening, and removed, the emasculator having been inserted by the other hand. The ovary is left on the floor of the vagina while the other ovary is sought for and removed in the same way. The emasculator, both ovaries and the hand are then withdrawn and the operation is complete. Normally, no further dressing or attention is necessary except that the animal should be kept as quiet as possible for a few days.

With keen attention to detail, such as cleanliness and the avoidance of any attempt at undue speed in operating, losses as a result of spaying can be reduced to a minimum.

General Instructions

At the time of the operation the animal's bowels should be as empty as possible.
Spay only when the animal is cool.
Have yards and surroundings free from dust.
Sterilize instruments thoroughly.
Keep hands and arms free and wear clean overalls.
Keep spayed cows at rest for ten days after operation.

IN THE GARDEN—*continued from page 465.*

When the lettuces start to heart in the hot weather, be careful not to water overhead as this will cause mould to develop, with the result that the hearts go slimy. In the warm weather watering should be done by furrow methods.

Tomatoes

Tomato plants may be set out this month. When planting, the lowest leaf on the plant should be touching the soil level. Bush varieties require fairly wide spacing, from 2 to 3 feet apart, while those which are to be pruned and staked, should be spaced 1 to 2 feet apart, with rows about 3 feet apart. The tomato enjoys plenty of organic matter worked into the soil and when preparing the beds, in addition to this organic matter, add 3 ounces or 4 ounces of blood and bone or market garden manure to the square yard.

Beans

Dwarf French beans can now be planted. *Brown Beauty, Negro Longpod, Emperor William* and *Wellington Wonder* are suitable varieties. Space the rows about 2 feet apart and allow 4 to 5 inches between the seeds. Plant the seed at least 1 to 2 inches deep.

Cucurbits

Seed of cucumbers, gherkins, marrows, pumpkins and squashes and preserving melons can be planted this month. Plant the seed 1 to 1½ inches deep. The spacing will depend upon the type of plant. Bushy plants can be spaced about 3 feet apart, while the running plants with long laterals should be spaced about 6 feet apart. A good plan is to plant the seed in a crater-like depression about 2 feet in diameter and place some old manure in this to act as a mulch.

Investigations of the Flour Beetles of the Genus Tribolium

III. A Colour Strain of *T. castaneum* (Hbst.).

By L. W. MILLER, B.Agr.Sc., Assistant Entomologist, Biological Branch

DURING 1942 and 1943, a survey was made to determine the species of *Tribolium* present in bulk wheat in Victoria (Miller, 1944A). In a sample of 5,000 insects obtained from a grain elevator at Ultima, on 23rd June, 1943, seven adult flour beetles were observed, which, at first sight, appeared to be specimens of *T. madens* (*Charpentier*), *the black flour beetle.* On closer examination, however, they were found to be identical with *T. castaneum* in all characters other than colour, suggesting that they might be a strain of that species.

From the progeny of these seven insects a culture of pure-breeding dark-coloured flour beetles was established, thus enabling comparisons to be made between both the external appearance, and the biology of these insects and the normal strain of *T. castaneum.*

External Appearance

Eggs.—No superficial differences could be observed between the eggs of the two different strains of *T. castaneum.*

Larvae.—The larva of the normal *T. castaneum* is yellowish-white with the dorsal part of the head capsule, claws, and terga of all segments, yellowish-brown in colour. The urogomphi and the tips of the mandibles are a deeper shade of yellowish-brown. The larva of this dark-coloured strain, however, is noticeably different in colour, the head capsule, claws, and terga being a dingy shade of brown. The urogomphi and the tips of the mandibles are a deep brownish-black colour.

Pupae.—Newly-formed pupae are practically identical. Within several days the pupa of the normal strain of *T. castaneum* turns yellowish and becomes progressively darker. The pupa of the "black" strain, however, turns a dingy shade of brown. The tips of the mandibles and claws gradually darken, becoming almost black just prior to the emergence of the adult.

Adults.—The normal adults of *T. castaneum* have been described by Good (1936) as "uniformly ferruginous or reddish-brown"; whereas the adults of the "black strain" are almost uniformly brownish-black to black in colour.

Genetical Experiments

A number of crosses were made between the normal or "red" *T. castaneum* adults and those of the "black" strain. In the F1

TABLE 1.—DETAILS OF F2 PROGENY OF "RED" AND "BLACK" STRAIN CROSSES.

Number.	Number of Progeny.	Number Red.	Number Intermediate.	Number Black.	Expected Numbers under 1 : 2 : 1 Hypothesis.			df.	Chi-square.
					Red.	Intermediate.	Black.		
1 ..	46	12	24	10	11·50	23·00	11·50	2	0·2609
2 ..	101	29	53	19	25·25	50·50	25·25	2	2·2277
3 ..	119	30	65	24	29·75	59·50	29·75	2	1·6218
4 ..	139	39	67	33	34·75	69·50	34·75	2	0·6978
5 ..	76	20	35	21	19·00	38·00	19·00	2	0·5000
6 ..	54	14	26	14	13·50	27·00	13·50	2	0·0741
7 ..	83	16	44	23	20·75	41·50	20·75	2	1·4819
8 ..	87	24	39	24	21·75	43·50	21·75	2	0·9310
	705	184	353	168	..	..	..	16	8·7952
χ^2 = ·7276									P = 90%

generation all the adults were a very dark-reddish brown shade—apparently an intermediate colour between the "red" and "black" coloured parents.

Eight pairs of these F1 adults were mated separately, and the progeny from each mating bred through to the adult stage. These F2 progeny were of three different colours—normal *T. castaneum* adults ("red"), dark-coloured insects ("black"), and dark-reddish brown insects ("intermediate"), as shown in Table 1:—

The chi-square values for the individual tubes were all less than the 30 per cent point for 2 df., the majority (tubes 1, 4, 5, 6, and 8) having chi-square values less than the 50 per cent. point. The total chi-square value of the experiment was 8·7952, which was less than the 90 per cent. for 16 df. Even the chi-square value, ·7276, for the pooled data of the 705 individuals was less than the 50 per cent. for 2 df. Apparently, therefore, the segregation of the F2 insects was in the ratio 1:2:1.

In confirmation of this, both the "black" and the "red" F2 insects were found to breed true and the "intermediate" coloured insects produced F3 progeny again segregating in a 1:2:1 ratio.

From these experiments it was concluded that the dark-coloured flour beetles were a definite colour strain of *T. castaneum*; the colour of *T. castaneum* being apparently due to a single factor.

Comparison of the Biology of the Two Strains of T. castaneum

Comparisons were made of the biology of the two strains of *T. castaneum* using two different food media, one a fine pollard fraction of high nutritive value and the other a white flour of low nutritive value.

The equipment and technique for conducting tests of this sort has already been described (Miller, 1944B). In these experiments, 100 newly hatched larvae of each strain were studied in each of the two diets; the four tests being conducted simultaneously at a temperature of 30°C. and a relative humidity of approximately 75 per cent.

The durations of the various stages of the life cycle have been summarized in Table 2.

No differences could be distinguished between the durations of either the incubation or the pupal periods of the two strains. Although the mean pupal periods in Diet 1 were slightly longer than those in Diet 2, no reliance could be placed on such small differences because of the relatively long intervals between observations. It is quite possible, however, that, by the use of a more exacting technique, the diet of the larva would be found to have a bearing on the duration of the pupal stage.

Certain differences were apparent between the durations of the larval stages of the two strains, and, consequently, also in the time taken to complete the life cycle. The life cycle of the normal "red" strain ranged from 36-65 days on the less nutritive diet, and from 22-37 days on the nutritive diet, whereas with the "black" strain the corresponding figures were 33-54 days and 22-42 days, respectively.

The numbers of larvae of each strain maturing in each food medium, together with the numbers of each sex present, and the mean larval periods can be seen in Table 3.

The survivals of the two strains on either diet were practically identical, approximately 47 per cent. surviving on the low nutritive diet (Diet 1), and 87 per cent. on the nutritive diet (Diet 2). Similarly, there were no marked differences in the proportions of the sexes present in either of the two strains.

TABLE 2.—SUMMARY OF BIOLOGY OF TWO STRAINS OF *T. castaneum*. TEMP. 30° C. R.H, 75%.

	Incubation Period.	Larval Stage.			Pupal Stage.			Complete Life Cycle.		
		Max.	Min.	Mean.	Max.	Min.	Mean.	Max.	Min.	Mean.
Diet 1.—(White flour, low vitamin content)—										
"Red" strain	4·0	56	28	41·0	7	4	6·1	65	36	50·8
"Black" strain	4·0	44	24	31·6	11	4	5·9	54	33	41·7
Diet 2.—(Pollard fraction, high vitamin content)—										
"Red" strain	4·0	28	13	15·9	6	4	5·6	37	22	25·9
"Black" strain	4·0	34	14	17·2	9	5	5·7	42	22	26·9

TABLE 3.—NUMBERS OF LARVAE SURVIVING, PROPORTIONS OF SEXES AND MEAN LARVAL STAGES. TEMP. 30° C. R.H. 75%.

—	Number Larvae Maturing.	Mean Larval Stage (Days).	—	Number Males.	Percentage Males.	Number Females.	Percentage Females.
Diet 1—							
"Red" strain ..	46/100	41·0	diff. = 9·4 days sd = 1·43 t = 6·573 exceeding 1 per cent. value or 91 df.	24	52·2	22	47·8
"Black" strain	47/100	31·6		25	53·2	22	46·8
Diet 2—							
"Red" strain ..	87/100	15·9	diff. = 1·3 days sd. = ·369 t = 3·52 exceeding 1 per cent. value for 172 df.	45	51·7	42	48·3
"Black" strain	87/100	17·2		43	49·4	44	50·6

The mean duration of the larval stage of the "red" strain on the less nutritive diet (Diet 1) was 41·0 days, which was 9·4 days longer than the duration of the larval stage of the "black" strain on the same diet. This difference was shown by the t-test to be highly significant. On the more nutritive diet (Diet 2), however, the mean duration of the larval stage of the "red" strain was 15·9 days, and that of the "black" strain 17·2 days, the difference of 1·3 days being highly significant.

Thus, although the normal "red" strain of *T. castaneum* developed more rapidly than the "black" strain on a highly nutritive diet, the reverse was the case when a diet of low nutritive value was used. Apparently, the "black" strain of *T. castaneum* was less sensitive to a deficient diet than was the normal strain.

The differences in the food responses of these two strains of *T. castaneum* were analogous to the differences that have been shown to exist between the nutritive responses of *T. castaneum* and *T. confusum* (Miller, 1944B). In this earlier paper, it was recorded that, although *T. castaneum* developed more rapidly than *T. confusum* on highly nutritive diets, its rate of development was slower than that of *T. confusum* on a deficient diet such as a reduction or patent flour. Since work by Barton-Wright (1941) and Fraenkel and Blewett (1941) had shown that white flours were deficient as a diet for *T. confusum* because of the deficiency of the B-group vitamins, it was suggested, in this earlier paper, that *T. castaneum* was probably more sensitive than *T. confusum* to deficiencies of some or all of the B-group vitamins.

If this assumption were valid, then from the results obtained in the tests with the two strains of *T. castaneum* it would seem that the "black" strain was slightly less sensitive to a deficiency of B-group vitamins than was the normal "red" strain.

Further work would, however, be necessary to verify these assumptions.

Summary

A previously unrecorded colour strain of *T. castaneum* was found in Victoria in 1943.

The adults of this new strain are dark brownish-black to black in colour whereas the normal colour of *T. castaneum* adults is reddish-brown.

Crosses between the two strains revealed that the colour of *T. castaneum* adults was apparently due to a single factor.

On a nutritive diet, the larvae of the normal "red" strain developed more rapidly than did those of the "black" strain. On a less nutritive diet, however, the reverse was the case. It may well be that this was due to the two strains differing in their sensitivity to a deficiency of B-group vitamins; the normal "red" strain being more sensitive than the "black" strain.

LITERATURE CITED.

Barton-Wright, E., 1941. Flour and the growth of *Tribolium*. *Nature* 148, p. 565.

Fraenkel, G. and Blewett, M., 1941. Deficiency of white flour in riboflavin (tested with the flour beetle *Tribolium confusum Duval*). *Nature* 147, p. 716.

Good, N. E., 1936. The flour beetles of the genus *Tribolium*. *U.S. Dept. Agr. Tech. Bull.* 498, 57 pp.

Miller, L. W., 1944a. Investigation of the flour beetles of the genus *Tribolium* (I). The incidence of *T. castaneum Hbst.* and *T. confusum (Duval)* in wheat and flour in Victoria. *Journ. Dept. Agr. Vic. XLII.* (5) pp. 217–221.

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JAM MAKING

By RACHEL M. PEILE

JAMS are made by boiling fruit and sugar together until a jelly-like set or a stiff consistency is obtained. Fresh fruit, pulp, dried fruit, or preserved fruit can be used for jam. If using fresh fruit, make up as soon as possible after picking.

To test for the finishing point of jam, use one of the following methods:—

Place a teaspoonful of jam on a cold plate and cool. If it crinkles when pushed with a spoon the jam is done.

Dip in spoon, turn in hand to let jam cool, then let drip from the edge. If it breaks off in flakes the jam is done.

Covering Jams

1. Pour a thin film of paraffin wax on to the jam, cover with a screw lid, paste paper over, or cover with cellophane.

2. Cut piece of paper to fit the top of the jam, dip in vinegar, place on surface of the jam. Cover with lid or paste paper over.

When jams are made from fruits rich in pectin and acid, they may be sealed either hot or cold. Jams made from non-pectinous and non-acid fruits should be sealed hot.

Pectinous Fruits.

Green gooseberries, tart cooking apples, black and red currants, wild blackberries, quinces, sour plums, loganberries, citrus fruits.

Fruits Containing Little or no Pectin or Acid.

Sweet apples, apricots, pineapple, peaches, very sweet grapes, pears, cherries, strawberries, melon, figs.

Good combinations may be made by mixing a pectinous with a non-pectinous fruit. Here are some examples:—

Gooseberry and cherry; strawberry and loganberry; light plum and peach.

When fruits are sweet or have been picked for some time, ¾ lb. of sugar to 1 lb. fruit should be used.

Spoiled Jams

Moulds and yeasts are minute plant forms found in the air. They are destroyed by boiling the jam. If jam is bottled hot into warm bottles, and if the sealing is efficient, no air can enter and yeasts and moulds will be excluded. Moulds sometimes grow on the surface of jam that has not been properly sealed. Yeasts cause fermentation which creates gas bubbles in jam which may lift the seal.

If there is an excess of sugar in a jam due to adding too much or cooking too long, crystals may appear.

Fermented jam should be thrown out. With mouldy jam remove mould and top jam. Crystallized jam should be reboiled with water added.

In the home it is better to make small rather than large quantities of fruit into jam, not more than 8 or 10 lb. at a time, preferably about 4 lb. There are three main methods of making jam.

FIRST METHOD

Cook fruit slowly with a little or no water until tender, with lid on pan. Add the sugar and dissolve (¾ lb. to 1 lb. sugar to 1 lb. fruit). Boil rapidly until the test is taken. The following jams are made by this method:—

Apple Ginger.—6 lb. cooking apples, 4½ lb. sugar ¼ lb. whole ginger. (May be omitted).

Peel core, and slice apples. Cover peelings and cores with water, simmer half an hour, and then strain. Add strained liquid to prepared apples and bruised ginger (the latter tied in muslin) and simmer about 1½ hours. Add sugar and cook to a good consistency.

Apple Marmalade.—6 lb. apples, 9 lb. sugar, 6-9 lemons, 6 pints water.

Slice lemons thinly, soak overnight in the 6 pints boiling water. Next day cook until rinds are tender, then add prepared apple. Cook until tender, add sugar and cook quickly until test is taken.

Apple and Orange.—4 lb. apples, 4 oranges (sweet), 3 lb. sugar.

Peel and slice apples, grate orange rind, and extract juice and add water to make 1 quart of liquid.

Apricot Jam.—4 lb. apricots, 4 lb. sugar, ¾ pint water, juice of 2 lemons.

Kernels from some apricot stones may be blanched and added.

Blackberry Jam.—3 lb. berries, 3 lb. sugar, juice of 3 lemons, ½ pint water.

Blackberry and Apple.—6 lb. blackberries, 2 lb. apples, 8 lb. sugar, juice of 2 lemons.

Prepare apples and cook in a little water until tender, add blackberries, and continue according to first method.

Black Currant.—4 lb. black currants, 4 lb. sugar, 2 pints water.

Carrot and Lemon Marmalade.—Slice 2½ lb. lemons thinly. Grate 1 lb. carrots on a coarse grater. Allow 6 lb. sugar and 6 pints water. Put lemon, carrot and water straight into the preserving pan without preliminary soaking with 3 tablespoons of lemon juice. Bring slowly to the boil. Simmer one hour. Add the sugar. Stir till disolved. Boil gently for 1 hour or until the mixture jellies. Oranges may be used in place of lemons.

Cherry Plum and Pineapple.—6 lb. plums, 1 pineapple, 4½ lb. sugar, ½ pint water.

Dried Apricot.—1 lb. dried apricots, 4 lb. sugar, 1 oz. almonds, 2 quarts water.

Cover apricots with boiling water in which a teaspoonful of bicarbonate of soda has been dissolved. Soak half an hour, rub off dust, rinse, add 2 quarts water; soak 24 hours, add almonds and proceed as for first method.

Dried Apricot and Pineapple.—2 lb. apricots, 1 large pineapple, 7 lb. sugar, 2 quarts water.

Make as for dried apricot, pineapple sliced or grated and added.

Dried Peach.—1 lb. dried peaches, 4½ lb. sugar, 2 lemons (juice), 2 quarts water.

Make as for dried apricot.

Fig Jam.—½ lb. preserved ginger, 6 lb. firm figs, 1 pint water, ½ pint vinegar or 3 lemons, 6 lb. sugar.

Stem fruit. Skin if desired by scalding in boiling water and rubbing. Slice figs, slice lemons thinly.

Gooseberry Jam.—6 lb. gooseberries (green), 8lb. sugar, 2 pints water.

Top and tail gooseberries, boil with water until colour is given.

Grape Jam.—6 lb. grapes (at least half under ripe), 3 lb. sugar. Remove stalks, press pulp, boil until tender, run through a colander to remove seeds.

Loganberry Jam.—4 lb. sugar, 4 lb. loganberries, one cup of water, boil 5-10 minutes. Squash fruit, bring to the boil, add sugar, boil 5 to 8 minutes.

Peach Jam.—6 lb. peaches, juice 3 lemons, 1 pint water, 4 lb. sugar.

Cut peaches into eighths and weigh. Cook with lemon juice and water until excess water has evaporated and the fruit is tender.

Plum Jam.—6 lb. plums, 5 lb. sugar, 1 pint water.

Cook plums with water until the fruit is well broken up. Jam may then be strained through colander to remove the stones, or the sugar added and the stones skimmed off as they rise to the top.

Plum Combinations—

Plum and peach.—Equal quantities of plums and peaches, make as for plum.

Plum (dark) and mulberry.—2 lb. mulberries, 3 lb. plums, 4 lb. sugar, ½ pint water. Cook plums first, then add mulberries. Make as for plum jam.

Plum (cherry and gooseberry).—2 lb. gooseberries, 3 lb. plums, 5 lb. sugar, ¾ pint water. Make as for plum.

Plum (cherry) and loganberry.—3 lb. loganberries, 3 lb. plums, ½ lb. sugar, ½ pint water. Cook plums, then add loganberries. Make as for plum jam.

Plum and pineapple.—See Cherry Plum and Pineapple.

Plum (dark) and raspberry.—Make as for plum and mulberry.

Quince Jam.—4 lb. quinces, 3 lb. sugar.

Peel, core, and cut up fruit. Cover with water and cook until tender and pink in colour.

Quince and Ripe Tomato (Mock Raspberry).—3 lb. quinces, 4 lb. sugar, 2 lb. ripe tomatoes, 1 pint water.

Prepare quinces. Pour boiling water over tomatoes and skin. Simmer fruit 1½ hours.

Raspberry Jam.—4 lb. raspberries, 4 lb. sugar.

Squash fruit and bring to the boil, add sugar, dissolve, boil 5 minutes.

Raspberry and Red Currant.—2 lb. red currants, 4 lb. raspberries, 6 lb sugar.

Stem currants, crush and bring to the boil. Boil 10 minutes, then add raspberries.

SECOND METHOD

The fruit is cut up, half the sugar is sprinkled on, then it is allowed to stand overnight to draw the juice. Next day it is boiled slowly with ½ pint of water until the fruit is quite tender. The remainder of the sugar is then added, dissolved, and the mixture boiled rapidly until the test is given.

Jams made by this method are as follow.—

Melon and Apple Jam.—6 lb. melon, 6 lb. sugar, 6 sour apples, 2 lemons.

Dice melon and stand overnight with half the sugar. Next morning add cut-up apple and sliced lemon.

Melon and Ginger Jam.—6 lb. melon, ¼ lb. green ginger, 4½ lb. sugar 3 or 4 small bird's-eye chillies.

Add scraped green ginger, finely cut, when putting jam on to boil.

Melon and Grapefruit.—8 lb. melon, ½ lb. grapefruit, 6 lb. sugar, 1½ pints water.

Grapefruit, finely cut, is added when jam put on to boil.

Melon and Lemon.—6 lb. melon, 2 lemons, 4½ lb. sugar.

Shred lemon finely, and add when jam is put on to boil.

Melon and Pineapple.—6 lb. melon, 1 medium sized pineapple, 4½ lb. sugar, 3 quarts water.

Peel, seed, and cut the melon into blocks. The melon must be crisp and fresh. Weigh Put the melon into a bowl. Sprinkle with half the sugar and allow to stand overnight. Next day add the cut-up pineapple and water and simmer till quite soft (about 1 hour). Then add balance of sugar, and when dissolved boil rapidly till of a good consistency.

Peach and Pineapple Chips.—6 lb. prepared peaches, 2 lb. pineapple, 6 lb. sugar.

Cut peaches into pieces and cover with half the sugar, stand over night. Next day add prepared pineapple.

THIRD METHOD

Conserves

A syrup of sugar and water is made—about 1 pint water to 6 lb. sugar. When boiling, the prepared fruit is added and cooked until the test is given. In a conserve the fruit remains whole or in large pieces, and does not mash up.

Loganberry Conserve.—6 lb. loganberries, 6 lb. sugar, 2 pints water.

Make up as for conserve method.

Pear Ginger.—4 lb. pears, 3 lb. sugar, 1 lb. preserved ginger, 3 tablespoonsful vinegar, grated rind of 2 lemons (yellow part), 1 quart water.

Make syrup of vinegar, sugar, and water and boil 5 minutes. Pour over prepared fruit, lemon rind, and cut-up ginger. Stand over night. Simmer slowly for about 2 hours.

GUARD AGAINST FIRE!

With the approach of summer, fire dangers increase and must be guarded against. Look to your fire breaks, to your fire-fighting equipment, and don't leave combustible rubbish lying around. Remember that a match or a cigarette butt may be down but not out. Fire could put you back where you started in a matter of hours.

Certified Pullorum Tested Flocks

A certified Pullorum Tested Flock is one in which all the breeding stock have given a negative reaction to the agglutination test for pullorum disease, and in which all such stock are kept under rigid conditions of isolation approved by the Chief Veterinary Inspector.

The undermentioned flocks have been certified by the Department of Agriculture, and will remain so until the next breeding season or until such time as the Chief Veterinary Inspector determines.

Full particulars of this scheme appeared in the February, 1942, issue of the *Journal of Agriculture*.

Application forms are obtainable from the Chief Veterinary Inspector, Department of Agriculture, Melbourne, C.2.

Owner.	Number of Birds.
Abikhair, E., 41 Wilfred-road, Ivanhoe, N.21	33
Ackfield, C., Jackson-street, Reservoir	88
Allison, Mrs. M., 30A Glen Eira-avenue, East St. Kilda	11
Archard, N. F., Yeoburn East, via Kerang	181
Armstrong, D. M., Fryer's-road, Campbell's Creek	199
Ashgrove Stud Poultry Farm, Mountain-road, Cockatoo	158
Bantick, H. M., Old Dandenong-road, Heatherton	555
Barastoc Experimental Farm, Central-avenue, Bayswater	229
Barlow, M., Everest-crescent, Olinda	41
Barnes, Mrs. A., "The Heights," Blackburn-road, Blackburn	2,333
Bartholomew, G., St. Arnaud	92
Bartlett, N. M., Pimpinio	338
Bassett, R. A., South Muckleford	143
Batey, L. J., Katandra West	481
Batten, J. H., Central-avenue, Bayswater	672
Beer, Mrs. E. V., Rainbow Lodge, South Kyneton	96
Bentley, F. W., Hastings-road, Frankston	1,080
Best, G. W., Elmhurst-road, Bayswater	166
Bingley, A., 333 Highbury-road, Burwood, E.13	213
Blyth Bros., Rowson-road, Bayswater	166
Chapman, Mrs. E., Youanmite	237
Christie, Messrs. R. R. and Son, St. Elmo Poultry Farm, Bentleigh	895
Clark, H. N., Bayswater-road, Croydon	2,262
Clegg, R. M., 52 Burns-street, Hamilton	55
Coats, C. J., Donald	70
Coupar, J. E., Nathalia	298
Cox, F. S., and West, C. P., Messrs., Grange-road, Cheltenham	199
Crowle, L. Z., "Monomeeth," Broadford	165
Cumming, H. D., "Larneuk," Naroghid	75
Davidson, A., 22 Sherbrooke-avenue, Ringwood	98
Davies, L. H., Westall-road, Springvale	191
Dawson, L. J., "Hill View," Eversley	151
Dawson, R. G., Maldon-road, Castlemaine	504
Dimoline, W. and Son, Heatherton-road, Noble Park	407
Dixon, Chas. E., Sinclair-road, Bayswater	448
Dookie Agricultural College, Dookie	389
Eastaugh, T. L., Point Nepean-road, Highett, S.21	345
Eastman Bros., Messrs., 52 Landell's-road, Pascoe Vale, W.8	1,732
Elliot, L. J., Blake-street, Nathalia	72
Elson, H., "Osborne," Mornington	104
Emmott, J. T., Verdun-street, Inglewood	212
Evans, Mrs. R., 50 Simpson-street, Kyneton	50
Everard, H. L., Hawkesdale	899
Everist, F. R., "Chota Wallah," Tyabb	39
Fitchett, C. W., Springvale-road, Tally Ho	548
Forbes, Mrs. R., Pental Island, c/o Swan Hill P.O.	294
Gammie, H. C., Tibrockney-street, Highett, S.21	152
Gartner, Miss M. T., 259 Middleboro-road, Box Hill	56
Gibbs, J. L., Shepparton	69
Gillespie, G. L., Katamatite	192
Giovanetti, G. E., Skene-street, Kennington, Bendigo	98
Goddard, Wm J., 356 High-street, Bendigo	158
Gough, L., Clive-street, East Brighton, S.6	103
Graham, C., "All Black Poultry Farm," Portarlington	45
Grant, D., 6 Laurel-grove, Blackburn	63
Greenshields, E. J., Lancefield	431
Greenwood, J., Canterbury-road, Forest Hill	193
Gregson, Mrs. E., Kyvalley	194
Grenville, G. W., "Granville Stud Poultry Farm," Springvale South	2,701
Gwyther, R. P., Valley-road, Highton, Geelong	348
Hall, R. H., Wal Wal	370
Hamblin, N. A., "Sunny Hill" Poultry Farm, Toolleen	1,441
Hamilton, A., "Lyncroft," Flinders	321
Hansen, Mrs. M. A., Katandra West	100
Hayes, R., Mt. Dandenong-road, Montrose	217
Hearse, Geo. E., Narre Warren North	76
Hemphill, A. E., "Glenara Poultry Farm," Monegeeta	521
Henderson, C. W., Shepparton East	448
Henderson, W. R., 194 Charman-road, Cheltenham, S.22	11
Hewett, A. T., Central-avenue, Bayswater	470
Hewitson and Phelan, "Golf House," Healesville	157
Hewitt's Poultry Farm, Skene-street, Bendigo	1,056
Hill, A. E., 26 Brenbeal-street, Balwyn	125
Hines Bros., Traynor's Lagoon, via St. Arnaud	970
Hipwell, Mrs. M., Maffra	99
Hobson, F., Oakleigh-road, Lower Ferntree Gully	142
Hockley, N. O., Coleraine-road, Hamilton	41
Horsfall, J. B., Hight-street, Lower Templestowe	1,599
Howden, Mrs. R., High-street, Traralgon	92
Huckle, W. H., Waverley-road, Glen Waverley	187
Hunt, R. R., 365 Highbury-road, Burwood, E.13	821
Jackson, Messrs. C. and H. G., Cadles-road, Carrum Downs	300
Johnson, A., Sunray-avenue, Cheltenham	644
Johnson, A. S., Burwood-road, Lower Ferntree Gully	1,235
Jolly, W., Five Ways, P.O.	245
Kay, L., 90 Pine-street, Reservoir	298
Kidgell, L. L., 34 Mullum-road, Ringwood	234
Kidgell, L. L., 34 Mullum-road, Ringwood	242
Kosch, E. W., Coromby	397
Kostos, D., Cr. Waverley and Collins roads, Oakleigh	658
Langton, Mrs. J., Croydon-road, Bayswater	36
Law, J., Lewis-road, Wandin	191
Lawrie, Mrs. M., 107 Albert-street, Sebastopol	231
Lennie, Mrs. J. E., "Dumbarton," Mount Scobie, via Kyabram	225
Lucas, G., 4 Downing-street, Blackburn	923
McConnell, R. W., Glenormiston South	884
MacKintosh, Walter C., Neerim South	365
Maclean, Charles C., Kelvinside-road, Noble Park	125
McDonald, J., 43 Bloomfield-avenue, Maribyrnong	92
McDonald, J. L., Lyons-road, Croydon North	288
McDonald, Mrs. E. M., 114 Barkly-street, Ararat	171
McDonald, R. A., "Barton," Moyston P.O., via Ararat	153
McErvale, P., Boronia-road, Vermont	2,515
McLaughlin, K. A., Dandevue Poultry Farm, Bayswater	793
McLaughlin, S. E. V., "Sutton Park," Hull-road, Croydon	191
McLeod, Miss K., "Hayfield," Digger's Rest	93
McNamara, O. J., 24 Sherbrooke-avenue, Ringwood	1,105
Maher, Allan E., "Alandale," Wal Wal	772
Mair W. P., Tyabb	43
Major, W. R., Girgarre	105
Mead, J. L., 28 Golf Links-avenue, Oakleigh, S.E.12	52
Meager, E., 12 Kennedy-street, Bendigo	21
Messenger, C., 240 Rathmines-street, Fairfield, N.20	136
Micell, Mrs. G., Monbulk	110
Moller, F. C., Warburton-road, Lilydale	48
Molson, W. E. 188 Blackburn-road, North Blackburn	649
Moore, H. A., Warrandyte-road, Ringwood North	660
Mumford, L. J., Steele-street, Healesville	348
Mynott, J. B., Bridgeland Park Estate, Main-road, Eltham	102
Nemet, P., Spring Vale-road, Spring Vale South	1,107
Nichols, Mrs. E. M., Yan Yean	662
Nicholson, C. A., 93 Doncaster-road, Box Hill	81
Orange, Mrs. C., Marong	170
Overman, C. J., Vernal-road, Mitcham	596
Owens, H. C., Waverley-road, Glen Waverley	69
Pearse, Mrs. H. F., Box 33, Donald	339
Peel, C. W., "Callemondah," Gnarwarre	294
Petrie, R. W., St. Arnaud North	146
Pobjoy, J., Patterson-road, Springvale South	523
Poole, A., Hull-road, Mooroolbark	318
Pooley, F. W., Canterbury road, Blackburn	257
Poulton, A. W., Vickers-street, Sebastopol	1,077
Rae, J., 277 Albert-street, Sebastopol, Ballarat	729
Ridge and Son, 42 Myrtle-grove, Blackburn	1,056
Ridgway, Geo., Callander-road, Noble Park	155
Robbins, R. B., Derby	83

CERTIFIED PULLORUM TESTED FLOCKS—*continued.*

Owner.	Number of Birds.
Robson, F., 16 Nelson-street, North Wonthaggi	12
Rushton, J. A., 11 Barker-avenue, Shepparton	609
Salmond, J. B., Deer Park	120
Sanders, A., Stud-road, Wantirna	373
San Miguel, Mrs. M. H., Woodhouse-grove, Box Hill	2,253
Schulze, Mrs. C. A. E., Box 52, Dimboola	206
Scouller, R. C., Tarrant-street, Cobden	243
Secar, W. "The Ranch," Station-street, Wesburn	195
Sleigh, H. R., High-street, Templestowe	173
Shipp, R., P.B., Kerang	492
Simmons, J. T., 6 Lindsay-avenue, Murrumbeena	8
Simpson, G. D., May-road, Glen Waverley	1,975
Skinner, Mrs. M. F., Princes-highway, Noble Park	76
Smith, E., Valley-road, Highton, Geelong	554
Smith, F., Lenham Poultry Farm, Terang	2,025
Smith, L. I., "The Ranch," Burwood-road, East Burwood	117
Spry, W. P., "Esswill," Culgoa	707
State Research Farm, Werribee	363
Stephenson, Mrs. E., Beard-road, Research	300
Stewart, J. A., Maldon-road, Castlemaine	777
Stewart, P. D., Bayswater-road, Croydon	22
Stiles Bros., "Fair View," Wallan	976
Streeter, H. A., Avoca	157
Sutcliffe, W., 71 Botanic-road, Warrnambool	104
Sutherland, J. M., Fulton-road, Box Hill	867
Sweeney, J. J., Tarara Stud Poultry Farm, 55 Rundle-street, Ararat	401
Swift, D. A., Kangaroo Flat	519
Taylor, E. D., Walker-street, Sebastopol	846
Throup, N. C., Neerim South	91
Throup, R. E., Neerim Poultry Farm, Neerim South	199
Travaglia, V., St. Arnaud Poultry Farm, St. Arnaud	876
Trinca, M., Valley-street, East Oakleigh	1,123
Triplett, C. A., Muskerry, via Goornong	184
Waldmann, F., Greythorn-road, North Balwyn, E.9	1,111
Walker, Mrs. E. H., Lancefield	173
Walters, V., High-street, Lower Templestowe	79
Wanliss, W. J., Springvale-road, Springvale South	684
Webb, A. E. H., Wimbleton Poultry Farm, Frankston-road, Cranbourne	2,848
Welch, T. A., cr. Bayswater-road and Central-avenue, Bayswater	765
West-Onley, K. E., "Len-lea," St. Arnaud	82
White, G. J., Watson's-road, Glen Waverley	818
Williams, V., Wangaratta Hatchery, Wangaratta	605
Wimhurst, J. C., Tongala	405
Winter, G., "Denehurst," Murgheboluc	385
Wohlers, S., Jung	377
Wright, A., Congupna Township, via Tallygaroopna	95
Youl, R. S., Wycherley, Wedderburn	1,127

Water for Poultry

A good water supply is essential to successful poultry farming. Poultry should always have access to plenty of good, clean drinking water. If water is restricted the health of the birds will be affected, less food will be eaten, fewer eggs will be laid, and the growth of young stock will be hampered.

It is important also that drinking water shall be always available to ducks, both day and night. If these birds are deprived of water for even a short period they become very thirsty, and when it is provided in sufficient quantities they will drink to excess, causing staggers or cramp, which may prove fatal.

An automatic drinking system can be recommended. It will ensure a regular supply of fresh water and save much valuable time and labour.

A laying fowl will drink about 5 to 6 oz. of water per day in normal weather, and much more in hot weather, therefore after allowing for some wastage approximately one gallon per day for every 20 birds will be required.

It is not advisable to put medicines or disinfectants in the water, as anything that makes it distasteful restricts the amount the birds will drink, and that in turn will affect health and production. When medicines are necessary they should be given through the food.

Drinking vessels should be cleaned regularly, and during hot weather they should be kept in a cool place.

[Contributed by the LIVE STOCK DIVISION.]

Tubercle-free Herds

ACCREDITED TUBERCLE-FREE HERDS.

The following herds have been declared free of tuberculosis under the *Accredited Tubercle-free Herd Scheme* conducted by the Department of Agriculture. Under this scheme a tubercle-free accredited herd of cattle is one in which the entire herd has passed two negative, successive, annual physical examinations and tuberculin tests, or upon disclosure of infection, three semi-annual, successive physical examinations and tuberculin tests applied by a State Veterinarian or by a qualified and registered veterinarian who is approved by the Chief Veterinary Inspector for that purpose.

Name.	Address.	Number in Herd.	Name.	Address.	Number in Herd.
Armstrong and Son	Wangaratta	105	Longerenong Agricultural College	Dooen	48
Ballarat Orphanage	Ballarat	105	Maloney, P. J.	Tongala	66
Banyule Stud Pty. Ltd.	Wangaratta	54	McNabb and Son, G. A.	Irrewillipe East	154
Black, I. S., Estate	Mount Noorat	53	Nancarrow Bros.	Kerang	52
Cribbes, T.	Wangaratta	39	Noonan, G.	Benalla	31
Deering, J. T.	South Wangaratta	61	Noonan, Mrs. S. A.	Benalla	35
Dennis, Mrs. A. A.	Frankston	23	Northcote Children's Farm	Bacchus Marsh	165
Dookie Agricultural College	Dookie	85	Onley, W. H.	"Glenholme," Caldermeade	67
Dunbar and Clark, Messrs.	"Hazeldean Dairy," Mount Dandenong	18	Parker, Mrs. L. M.	Tallarook	56
Geelong Grammar School	Corio	78	Payne, A. E. T.	"Yarra View," Lilydale	66
Gibson, Mrs. C. S.	"Sweeney's," Eltham	35	Payne, T. E. N.	"Woodburn," Kilmore	44
Gorman, A. W.	"Cathcart," Alexandra	57	Poole, M. A. and D.	Caldermeade	155
Griffin, G. W.	Gladysdale	49	Poole, M. A. and D.	Yannathan	79
Griffiths, J. G.	Benalla	121	Powell, T. S.	"Carellen," Mansfield	43
Henry, J. A.	Warrnambool	41	Richardson, Bros., Messrs.	"Faldinghurst," Upper Beaconsfield	30
Howlett, Mrs. G. and Miss E. Samuel	Lang Lang	55	School of Horticulture	Burnley	6
Jahobi, L. W.	"Granada," Yannathan	80	State Experiment Farm	Rutherglen	37
Kane, F. E.	Warrnambool	28	State Research Farm	Werribee	245
Kilmany Park Farm Home for Boys	Sale	105	Stephens, Dr. F.	Vermont	32
Lady Talbot Milk Supply Co.	Cranbourne	479	Vagg, T. R.	Officedale	45
Lawrence, P. H.	"Rainga," Tarrawarra	83	Wells, W. G.	Caldermeade	65
			Woodyer, P. A.	Mornington	20

In addition to the above-mentioned, the herds set out hereunder, may be considered free of tuberculosis. All these herds have given negative reactions to two or more successive tests conducted by departmental veterinary officers, but inasmuch as replacement cows are only submitted to one test before being admitted to the herds, they cannot be considered as accredited under the accreditation scheme which requires, among other things, that no cow shall be admitted to the herds unless it has given two (2) negative reactions at an interval of 60 days, and must be kept in isolation during the period between the two tests.

Name.	Address.	Number in Herd at Last Test.	Name.	Address.	Number in Herd at Last Test.
Abbey, S. G.	Mernda	7	Bellis, Mrs. A.	Fyansford	15
Alexander, Miss R.	Ballarat East	1	Benson, R.	South Morang	40
Anderson, A. R.	Craigieburn	123	Bertuch, A. W.	Harcourt North	22
Anderson, Mrs. N. J.	North Geelong	18	Bickley Bros.	Wollert	64
Anderson, J. B.	Warrnambool	19	Bingley, R. P.	West Geelong	31
Andison, J. A.	Thomastown	46	Blackmore, P. J.	Ballarat North	57
Andrew, T. S.	Whittlesea	91	Blake, Mrs. J.	Yarragon	11
Andrew, W.	Whittlesea	123	Blood, J.	Ballarat	8
Andrews, E. H.	Templestowe	19	Blythe, R. E.	Connewarre	71
Angliss, Mrs. R.	Ballarat	1	Boland, Mrs. A.	Yarragon	31
Angus, W.	Moolap	6	Boland, D.	Yarragon	40
Armstrong, Mrs. M. A.	Sebastopol	15	Booth, Mrs. A.	Warrandyte	7
Artley, A.	Sebastopol	11	Bourke, G. J.	Fairfield	82
Atkinson, A.	Cambrian Hill	21	Bourke, J. W.	Somerton	37
Atkinson, V.	Cambrian Hill	26	Bourke, W. J.	Alfredton	26
Attwood, F. A.	Eaglehawk	18	Bradbury, G.	Kangaroo Flat	20
Baddon, D. W.	Yarragon	74	Brady and Cunningham	Doncaster	28
Baglin, E.	Wallington	41	Bray, Mrs. O. C.	Glenroy	34
Bailey, Mrs. A.	Doreen	11	Brereton, E.	Kennington	25
Baker, A.	Bannockburn	32	Brock, J. N.	Epping	16
Banfield, J. G.	Rosanna	66	Browell, L.	Golden Square	15
Barclay, A. H.	Whittlesea	93	Brown, J.	Geelong West	7
Barker, Mrs. E. M.	Huntly	11	Brown, Mrs. A.	Malden Gully	11
Bates, D. S.	Whittlesea North	25	Brown, R.	Kennington	4
Bates, J.	Connewarre	21	Brownhill, C. E. H.	Bundoora	34
Batten, R. J.	Wollert	51	Bryden, A. C.	Bendigo	17
Beck, J. P.	Ceres	48	Bumpstead, K.	Moolap	10

Name.	Address.	Number in Herd at Last Test.
Bunting, J.	Epping	30
Burke, T. S.	Huntly	19
Burns, D.	Moolap	8
Butler, W.	Wallan	69
Cahill, J. M.	Warrandyte	8
Callaghan, Bros.	Thomastown	66
Callaghan, L.	Epping	28
Cameron Bros.	Belmont	67
Cardwell, E. F.	Whittlesea	62
Carroll, M.	Fyansford	28
Cameron, G. A.	Connewarre	36
Cameron, J. J.	Connewarre	53
Carr, G.	Leopold	20
Carr, W. J.	Wollert	62
Carter, R. H.	Fyansford	23
Catt, G. P.	Yarragon	53
Cavagna, Miss	Sedgwick	7
Chadwick, Mrs. E. G.	Doreen	39
Challis, L. J.	Connewarre	57
Child, G. P.	Epping	54
Chiminello, A.	Epping	35
Christian Bros.	Doreen	42
Clark, H. M.	Nerrina	18
Clark, P. W.	Whittlesea	58
Clark, W. and T.	Kal Kallo	68
Clemence, S.	Warrenheip	23
Clunes, P.	Coburg	42
Cochrane, C.	Ballarat North	31
Cocks, J. J.	Marong	17
Collins, L.	Doreen	54
Collis, R.	Yarragon	1
Conway, L. T.	Sedgwick	10
Cooke, S. J.	Belmont	38
Cornfoot, D. H.	Whittlesea	43
Coulter, G.	Ballarat North	19
Coulthard, J. J.	Whittlesea	76
Cox, E. H.	Heidelberg	65
Crack, Mrs. E.	Bendigo	12
Craker, Mrs. E.	Warrandyte	5
Crawford, J.	Yarragon	44
Cross, G. A.	Mount Rowan	22
Crowe, P.	Gnarwarre	20
Crowle, A. J.	California Gully	16
Cuddihy, T. D.	Lovely Banks	26
Curtis, W.	Wallington	35
Danaher, J. V.	Whittlesea	70
Danns, N. C.	Whittlesea	27
Dans, C.	Connewarre	80
David, Mrs. M.	Ballarat	2
Davies, A. H.	Drysdale	20
Dennett, C. A.	Craigieburn	40
Deutscher, H. W.	Mernda	155
Devereux, Mrs. A.	Ballarat	3
Dickinson Bros.	Sebastopol	54
Dillon, L. W.	Epsom	18
Doggett, T.	Kangaroo Flat	17
Douglas, Mrs. J.	Alfredton	52
Downing, J.	Canadian	5
Dowton, Mrs. H.	Yarragon	47
Draper, L. S.	Wollert	35
Duke, J.	Ballarat East	1
Dunstan, W.	Pascoe Vale	32
Dwyer, F. P.	Greensborough	40
Earl, H.	Highton	3
Eckersley, W. H.	Alfredton	40
Edwards, S. R.	Sebastopol	14
Elford, S.	Magpie	34
Ellis, P.	Tullamarine	19
English, N. J.	Donnybrook	47
Evans, D.	Mount Duneed	15
Evans, G. W.	Highton	15
Faulkner, G.	Yarragon	40
Fergusson, M. A.	Whittlesea	115
Ferres, Mrs. M. E.	Mount Clear	21
Fitzpatrick, W.	Mandurang	9
Fitzgerald, D.	Leopold	45
Fitzsimmons, B.	Lower Templestowe	35
Flanagan, A. D.	Epsom	10
Flynn, O.	Epsom	21
Fox, A.	Mernda	68
Franklin Bros.	Sebastopol	29
Franklin, F. M.	Sebastopol	15
Friswell, H.	Bendigo	42
Galbraith and Walker	Greensborough	31
Gallagher, J.	Golden Square	20
Gallus, E. H.	Doncaster	13
Gamble Bros.	Greenvale	153
Gardiner, A. M., Estate of	Whittlesea	91
Gardiner, C. E.	Epping	29
Gargan, M. J.	Marshall	43
Gentner, H.	Eaglehawk	9
Gerrett, W. T.	Ballarat North	19
Gibbs, C.	Arthur's Creek	30
Gillies, N.	Diamond Creek	32
Godfrey, A. J.	Yarragon	49
Godfrey, W. and W.	Moolap	42
Goulden, J. B.	Wilson's Reef	54
Graff, Mrs. M. G.	Mernda	21
Graham, A. E.	Connewarre	35
Graham Bros.	Whittlesea	27
Gray, J. H.	Herne Hill	74
Green, J.	Eppalock	15
Green, R.	Leopold	27
Green, W.	Mernda	7
Greer, A.	Wollert	32
Griggs, Mrs. H.	Yarragon	47
Grinter Bros.	Whittington	52
Grinter, T.	Whittington	33
Guidice, J. J.	Kangaroo Flat	17
Gunn, A. J. B.	Ballarat	7
Gunn, W.	Kangaroo Flat	10
Hall, A. M.	Bullock Creek	31
Hall, Mrs. J. E.	Whittlesea North	9
Hamilton Bros.	Huntly	17
Hamilton, C. H.	Yarragon	59
Hancorne, Miss M. R.	Yan Yean	34
Hanrahan, Miss E.	Sebastopol	4
Hanrahan, N.	Sebastopol	6
Hargreaves, W.	Emu Creek	10
Harmer, L. T.	Thomastown	44
Harrison, H. N.	Ballarat	17
Hawkes, Miss D.	Warrandyte	14
Hayes, J. J.	Smythe's Creek	6
Hedges, J. T.	Ballarat	9
Hehr, R.	Wollert	34
Henderson, J.	Donnybrook	58
Henshaw, E.	Lower Templestowe	9
Hewitt, C. J.	Wattle Glen	7
Hewitt, H.	Ballarat	13
Hickinbotham, Miss N.	Whittington	10
Higgs, R. N.	Yan Yean	58
Hilderbrand, P.	Sebastopol	21
Hill, H.	Campbellfield	48
Hill, J.	Somerton	86
Hill, W.	Ceres	25
Hill, W.	Somerton	39
Hinchcliff Bros.	Whittington	74
Hogan, Miss M.	Cambrian Hill	20
Hobbs, Mrs. F. J.	Doncaster	6
Hocking, A. R.	Canadian	12
Hoctor, J. and Son	Greenvale	34
Hooper, A.	Moolap	15
Hose, W. J.	Grovedale	33
Houlahan, P.	Eppalock	40
Houlahan, T. J.	Eppalock	43
Huggins, R. E.	Ballarat	1
Hughes, Mrs. R. E.	Ballarat East	14
Hutchinson, J. B.	Drysdale	23
Ireland, C. E.	Yarragon	17
Jackson, Mrs. M. A.	Heidelberg	7
Jackson, Mrs. M.	South Warrnambool	6
Janefield Farm	Bundoora	43
Jeffrey, J. T.	Mernda	93
Jenkins, Mrs. A.	Mount Rowan	22
Jenkins T. H.	Whittlesea	22
Jinks, J.	Curlewis	43
Johns, A.	Highton	34
Johnstone, Miss J. A.	Mernda	12
Jones, I.	Lovely Banks	43
Jones, S. E.	Campbellfield	19
Jones, S. G.	Epsom	13
Jukes, C.	Epping	42
Jukes, W. H.	South Morang	38
Junor, G. M.	South Morang	56
Kane, F. E.	Warrnambool	28
Kell, W. E.	Greensborough	23
Kempton, C. J.	Highton	13
Kerr, J.	Mandurang	7
Kerwin, H. E.	Eaglehawk	21
Kilpatrick, E.	Mernda	89
Kinnersley, F. and Son	Wendouree	19
Kirkwood, S.	Eaglehawk	12
Knight Bros.	White Hills	42
Knight, G. A.	Sebastopol	29
Knowles, J. T.	Ballarat	3
Lacy, G. C. and Son	Cambrian Hill	32

Name.	Address.	Number in Herd at Last Test.
Lacy, N. C.	Cambrian Hill	13
Lane, J.	Warrnambool	9
Langdon, C. W.	Barwon Heads	27
Lanning, W.	Moolap	17
Latta, Mrs. J.	Warrnambool	6
Lawry Bros.	Tandara	113
Lay, P.	Alphington	35
Lehmann, A. H.	Epping	36
Lemin, F.	Waurn Ponds	33
Levett, E.	Warrnambool	12
Leviston, A. E.	Ballarat East	25
Leviston, G.	Ballarat East	9
Lewis Bros.	Beveridge	64
Lincoln, Mrs. L. M.	Portarlington	46
Littlejohn, E.	Grovedale	22
Lloyd, W. M.	Mickleham	6
Lobb, J. C.	Mickleham	3
Lodington, Mrs. I. E. M.	Ballarat	8
Long, H. S.	Dingee	94
Long, J. D.	Epping	70
Longuehaye Bros.	Point Lonsdale	32
Love, J. E.	Strathfieldsaye	16
McAllister, K.	Whittington	36
Mackie, F. K.	Yarragon	63
McConachy, E. T.	Highton	33
McCormack, D.	Woodstock	59
McCormick, T.	Geelong West	24
McCulloch, A. A.	Warrnambool	28
McDonald, F.	Queenscliff	63
McDonald, Mrs. M.	Belmont	14
McDonald, N.	Highton	21
McDowell, R. H.	Greensborough	26
McEncroe Bros.	Bendigo	22
McGregor, W. B.	Mernda	44
McKay, L.	Kal Kallo	13
McKay, Miss E.	Donnybrook	51
McKay, Mrs. H. E.	Ballarat South	10
McKendry, J.	Doreen	69
McKenzie, D. I.	Marong	95
McLean, J. F.	Bundoora	24
McManus, D. J.	Napoleons	18
McManus, J. W.	Napoleons	14
McMurray, P. J.	South Morang	36
McNabb Bros.,	Tullamarine	95
McNally, J. H.	McLeod	4
McPhee, K.	Whittlesea	106
McPherson, A.	Yan Yean	82
McPherson, E. D.	Upper Plenty	27
McQuarie, J. C.	Mickleham	12
Mahood, J. E.	Purnim	113
Malcolm, W.	Drysdale	31
Maltzahn, Mrs. E. N.	Campbellfield	45
Mannes, W.	Strathfieldsaye	39
Martin, Miss A.	Napoleons	21
Martin, Miss G.	Ballarat	11
Martin, W. B.	Ballarat	20
Mashiter, T. R.	Greenvale	60
Mason, Arthur	Donnybrook	62
Mason, N.	Donnybrook	60
Maskell, E.	Fyansford	28
Mathieson, A.	Whittington	25
Matthey, A. J.	Bannockburn	111
Maxwell, J.	Whittlesea	32
Mays, Mrs. A. M.	Doncaster	6
Melling, T.	Kennington	16
Menhennett, F. W.	Sebastopol	21
Mercer, H.	Long Gully	18
Meredith, W. J.	Bundoora	68
Meyer, N. R.	Wallan	70
Millar, Mrs. G.	Smythe's Creek	51
Miller, A. J.	Whittlesea North	50
Miller Bros.	Greensborough	45
Miller, D.	Epping	42
Moller, C.	Wallington	33
Moller, H.	Leopold	38
Moore, R. G.	Moolap	23
Morris, C.	Sebastopol	28
Morris, E. J.	Huntly	19
Mortimore, S.	Epping	29
Mosig, H. C.	Epping	23
Munro, M. J.	Leopold	20
Murfet, Mrs. S.	Huntly	21
Nankervis, L.	Mandurang	15
Nash, A	Corio	44
Nash, H. A.	Tullamarine	42
Nebel, Mrs. A. E.	Thomastown	39
Nelson, D.	Highton	58
Nestor Bros.	Wendouree	40
New, H. G.	Craigieburn	15
Nickols Bros.	Tandara	72
Noonan, J.	Sedgwick	50
Norton, J.	Yarragon	10
Notman, J.	Reservoir	68
O'Dell, J. E.	Ballarat East	21
O'Donnell, P.	Wendouree	38
O'Gorman, A.	Craigieburn	67
O'Halloran, J.	Sebastopol	28
O'Hern, T.	Epping	61
O'Keefe, J. P.	Warrnambool	21
Oliver, E. J.	Mickleham	32
Oliver, W.	Campbellfield	72
Olliver, Mrs. S. E.	Ballarat	14
O'Neill, E.	Yarragon	54
O'Toole Bros.	Yarragon	107
O'Toole, T. J.	Yarragon	10
Page, F. J.	Mount Rowan	38
Padovan, J.	Yarragon	28
Panozzo, Mrs. C.	Yarragon	92
Parker, R. H.	Craigieburn	91
Partridge, F.	Harcourt North	29
Pascoe, Mrs. W. J.	Glenroy	2
Patullo, F. E.	Mickleham	31
Payne, A.	Tullamarine	23
Pearce, A. E.	Mandurang	55
Pearce, J.	Mandurang	24
Peel, A. L.	Drysdale	16
Pegg, W. E.	East Geelong	6
Pentland, E.	Maiden Gully	8
Pentland, F. C.	Marong	26
Pepper, D. S.	Wattle Glen	38
Phillips, E.	Mt. Pleasant	22
Phipps, G.	Point Lonsdale	14
Pigdon, B. A.	Waurn Ponds	55
Pilcher, W.	Kangaroo Flat	13
Pitson, R. H.	Yarrambat	19
Pointer, F. A.	Upper Plenty	75
Pope, W. R. E.	Whittlesea	19
Portingale, J.	Campbellfield	33
Power, L. J.	Mernda	39
Putt, Mrs. D.	Bellarine	22
Quinlan Bros.	Epping	48
Ramage, J.	Mt. Pleasant	28
Rankin, J. W.	Yarragon	43
Rawlings, J. H.	Whittlesea North	31
Reddish, Geo.	Coburg	11
Renfrey Bros.	Drysdale	11
Renfrey, R. R.	Bellarine	22
Renkin, R.	Ballarat East	11
Reynolds, Misses	Yarragon	15
Richards Bros.	Leopold	56
Richards, T.	Ballarat	29
Richards, W. J.	Warrenheip	20
Richardson, C.	Curlewis	45
Richardson, D.	Leopold	23
Richen Bros.	Moolap	47
Ricketts, A.	Mount Duneed	29
Ridsdale, Mrs. M. M.	Yarragon	30
Riley, P.	Curlewis	50
Roche, Mrs. S. M.	South Morang	97
Rodgers, E.	Whittlesea North	14
Rosewarne, Miss P.	Yan Yean	49
Rowe, Mrs. M.	Eaglehawk	19
Ruff, A.	White Hills	12
Rumpf, D.	Fyansford	13
Salathiel, R. W.	Big Hill	14
Salau, E.	Strathfieldsaye	12
Scheuffele, C	Epsom	24
Schreenan, E. and Son	Sebastopol	73
Scott, C. M.	Diamond Creek	49
Scott, G.	Connewarre	25
Scott, Mrs. J. M.	Whittington	118
Scott, R	Marshall	97
Seeber, B.	Thomastown	28
Semmens, J. H.	Sedgwick	18
Shankland, I. D.	Greenvale	13
Shaw-Logan, T.	Glenroy	81
Sheahan, J.	Templestowe	30
Shearer, G.	Warrenheip	18
Shearer, J.	Warrenheip	11
Siebel, F.	Thomastown	29
Simpson, N.	Yarragon	35
Slorach, J.	Whittlesea	29
Smirfitt, J. E.	Epping	52
Smith, F. A.	Invermay	15
Smith, H. H.	Heidelberg	33
Smith, J. R.	Mernda	28

Name.	Address.	Number in Herd at Last Test.
Smith, L. W. W.	Bundoora	73
Smith, M.	Heidelberg	43
Smith, R. A.	Epping	35
Smith, S. E.	Epping	33
Smith, S. H. A.	Yan Yean	17
Smith, W. J.	Diamond Creek	68
Sobey, Bros	Napoleons	66
Somerville, A.	Strathfieldsaye	15
Somerville, J.	Strathfieldsaye	14
Somerville, M.	Strathfieldsaye	15
Somerville, P.	Strathfieldsaye	23
Somerville, W.	Strathfieldsaye	48
Southon, H. W.	South Morang	40
Spedding, Mrs. S. A.	Ballarat North	5
Spruzen, G.	Wollert	41
Stacey, H. W.	Connewarre	60
Stacey, R.	Warrenheip	29
Stenning, R., Estate of	Wollert	34
Stephens, H.	Epping	10
Stevenson, E.	Wendouree	35
Stimson, T.	Woodstock	34
Story, A. E.	Emu Creek	36
Story, T.	Mandurang	24
Stringer, R.	Mickleham	4
Stuart, W. A.	Black Hill	3
Studleigh Estates	Greenvale	128
Suffern, M.	Golden Square	17
Sunderland, W.	Highton	28
Swanton, Mrs. C.	Invermay	41
Symons, Estate of J. C.	Marong	55
Synot, C.	Fyansford	23
Thomas, Mrs. E.	Broadmeadows	10
Thomas, J.	Mandurang	39
Thomas, Mrs. V. E.	Yan Yean	17
Thompson, A. E.	Sebastopol	3
Thompson, H.	Whittington	35
Thompson Bros.	Connewarre	21
Thompson, W. B.	Moolap	93
Thurlow, A. E.	Yarragon	34
Toman, Mrs. A.	Golden Square	15
Tomkins, I.	Belmont	14
Tomkins, Mrs. E.	Moolap West	19
Toshack, H. J.	Wendouree	38
Towt, C. W.	Glenvale	147
Trahair, R.	Maiden Gully	49
Trigg, Mrs. A.	Breakwater	20
Troutbeck, H. R.	Mickleham	39
Tuddenham, F. T.	Cherry Tree	19
Tuddenham, M. J.	Cherry Tree	36
Twigg, G. E.	Tandara	61
Twomey, A.	Greenvale	39
Tyrell, H. S.	Marcus	58
Tyrrell, S. T.	Yarragon	81
Underwood, V. D.	Alphington	13
U'Ren, R. A.	Campbellfield	41
Vallence, C. A.	Epping	19
Vearing, E.	Epping	6
Vernon Estate	Cherry Tree	46
Vincent, Mrs. A.	Warrenheip	19
Wallace, R.	Breakwater	24
Wall and Faulkner	Marshall	77
Waller, R.	Ballarat	26
Walsh, B.	North Geelong	39
Walsh, C. J.	Yan Yean	7
Warner, K.	Batesford	33
Warren, E. and T.	Moolap West	36
Warren, S.	Moolap West	26
Watkins, F.	Campbellfield	71
Wheeler, W. A.	South Morang	34
Whelpton, B.	Whittlesea North	88
White, A. J.	Yarragon	40
White, L. and S.	Alfredton	53
White, T. L. R.	Alfredton	53
White, W. H.	Ballarat West	17
White, W. H.	Smythe's Creek	57
White, W. J.	Alfredton	18
Whitelock, E. A. and E. J.	Epsom	23
Whitfield, A. E.	Bendigo	6
Whittingham, E. W.	Greensborough	33
Wicks, C.	Golden Square	18
Wiffin, W.	Bellarine	54
Wightman, T. A.	Ballarat East	11
Williams, E. A.	Thomastown	32
Williams and Berryman	Bendigo	15
Williams, Mrs. N.	Tullamarine	40
Williamson, E. H.	Batesford	39
Williamson, H.	Greenvale	19
Williamson, J.	Doncaster (High-street)	3
Willis Bros.	Craigieburn	54
Wills, R. G.	North Geelong	23
Wilson, J. E.	Diamond Creek	11
Wilson, J. H.	Eltham	3
Wilson, Mrs. M.	South Morang	12
Wolter, Miss R.	Barwon Heads	26
Wooster, G. S.	Watsonia	23
Wrest, W.	Epping	93
Wuchatsch, J. D.	Epping	17
Yann, R.	Wollert	52
Young, A.	Queenscliff	18
Young, J. A.	Sedgwick	39
Young, R. L.	Wollert	26
Young, W. S.	Sedgwick	54
Ziebell, H.	Thomastown	40

In addition to the above herds, there are 1,470 head of cattle on 268 properties supplying milk to Benalla, Wangaratta, Rutherglen, and Yea, that have passed two successive negative tests.

There are also 433 herds in which 11,896 head of cattle have passed one test, and may be considered, therefore, to be in process of becoming tubercle-free herds.

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Issued by direction of the Hon. N. A. Martin, M.L.A., Minister of Agriculture.

SUBSCRIPTION RATES

The Journal is issued monthly. The subscription, which is payable in advance and inlcudes postage, is 3s. per annum for the Commonwealth and New Zealand, and 5s. for the United Kingdom and Foreign Countries. Single copy, Threepence. Subscriptions should be forwarded to the Director of Agriculture, Melbourne, C.2.

POSTAGE RATES

The postage required for this issue is:—To Australia and New Zealand, 1½d.; to United Kingdom, 2½d.; to United Kingdom via All-sea Route, 1½d.; to other British Possessions, 2½d.; to U.S.A. and Foreign Countries, 3½d.

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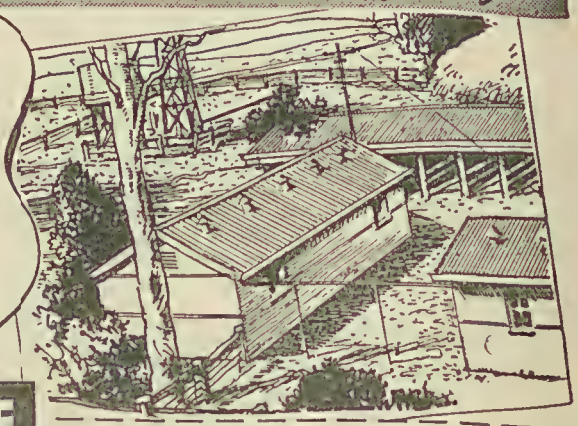

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Lucerne Growing

By L. C. BARTELS, B.Agr.Sc., Senior Agrostologist

LUCERNE is a fodder crop of outstanding worth, and one that has played an important part in the development of agriculture in this State, particularly in irrigation districts. There are still great opportunities for its extended culture in practically all districts.

A perennial, summer-growing leguminous plant, lucerne is adapted to a wide range of conditions of soil and climate and thrives in normally dry areas under irrigation. It does not grow well in humid climates and it will not grow in water-logged soils.

The plant develops deep roots and, in consequence, has great tenacity and wonderful resistance to dryness. It grows best in deep soils. Under irrigation, or in places where subsoil water is present at sufficient depth, lucerne has the capacity to make a succession of growths during the growing season and if cultural practices are good this productiveness is sustained for ten years and more, before the lucerne begins to thin out. Good cultural practices imply regular and moderate watering, and liberal manuring, usually with superphosphate.

Lucerne is commonly used for grazing and exhibits wonderful carrying capacity.

As a soil renovator lucerne excels. It grows well on land where fertility has been lowered by cereal growing, and in Victorian irrigation areas lucerne-growing for a number of years has been the basis for the intensive culture now practised in many of the districts.

Lucerne is adapted for cutting and the production of hay. Usually five cuts are made at intervals of five to six weeks from October to April. Aggregate yields of five tons of air-dried hay are obtained and the quality of this hay, governed by the processing, places it in a foremost position among the fodders.

Lucerne is usually associated with irrigation, and its value for the dry areas is not yet fully appreciated, but it is being grown successfully even in the Victorian Mallee. It is probable that it would be more extensively grown if farmers gave it reasonable treatment, because most of the failures with lucerne have resulted from poor preparations, inadequate treatment and persecution by over grazing.

Farmers everywhere in the State may be encouraged to grow lucerne. Those who have not grown it are urged to try it, and those who have grown it are recommended to give it every attention so that it can do its best.

Sowing

Careful preparation for sowing is recommended. Because of its long life and productiveness it deserves a good start, and at least as much preparation as is usually given for annual crops such as wheat.

Sowing may be done in autumn or spring and March/April and August/September are indicated as appropriate times. Lucerne is normally a summer grower and it is greatly handicapped if sown too late in autumn, when winter-growing weeds compete and winter pests such as " pea-mite " and lucerne flea abound. People who sow in June thinking they are conforming to the advice to sow in autumn, are inviting failure.

Extended preparation is desirable. Virgin land is not suitable and on land newly cleared of timber, one or more preliminary crops should precede lucerne. This is of particular importance on land to be irrigated.

A firm clean seed-bed is desirable. This is best obtained by leaving the land in bare fallow, so that advantage may be taken of favourable weather, and to permit sowing to be done at the appropriate time. Fallowing almost ensures successful establishment even in unfavourable seasons.

The choice of variety need not cause much worry. Australian lucerne is suitable for general use. The ordinary lucerne represented by the " Hunter River " variety is superior to imported varieties. This has been demonstrated in comparative tests and after pub-

A nice crop of lucerne on the property of Mr. E. G. Finch, Werribee.

lication of the results all lucerne became "Hunter River" type. Before the war when lucerne seed was imported a percentage of the seed was stained and mixed through the bulk.

Lucerne in the field shows many variations, and by natural selection types unsuitable to local conditions are eliminated. It can be understood then that the produce from two or three successive generations of locally grown lucerne shows closer adaptation to conditions than does imported seed.

Rate of seeding was formerly much heavier than is now recommended. Six or eight pounds of seed per acre is enough. It represents at least thirty or forty seeds per square foot.

Sowing lucerne seed may be done in different ways. It may be broadcast, but a most practical and economical way is to drill the seed by mixing seed and superphosphate, and sowing through the manure run of the drill. If the tubes are withdrawn from the hoes and allowed to dangle, the seed is scattered in the rill made by the hoe or disc of the drill and a light harrow or chain spread and trailing behind will effectively cover the seed. The use of superphosphate is most important in the establishment of lucerne. Mixing with the seed should be done just before sowing (preferably in the paddock).

Lucerne is a delicate plant when young, but it is very hardy when established. The seed usually has a proportion of hard seeds, and this means belated germination of some of the seed. The tiny little plants can grow into big crowns and many a "strike" regarded as a failure has developed successfully.

Weeds may threaten to smother the lucerne, and such weeds as Cape weed may be particularly bad in autumn-sown lucerne. In spring "fat hen" and "hogweed" may develop prominently. Peppercress may be thick too. In some cases a judicious use of the mower is recommended. Most of the weeds are checked by clipping but the lucerne will survive. Apart from this action to reduce the danger of suppression by weeds, there is no benefit in mowing the young lucerne. It may be allowed to grow and gather strength to secure itself until such time as it presents a growth worth cutting.

Germination by rain is always desirable, but if the seed-bed is dry and irrigation is available it is better to irrigate before sowing than to water after sowing to bring up the seed. The latter method may lead to soil "crusting" with resultant damage to the seedlings.

In good conditions the lucerne will be up in four days. Care should be taken not to "drown" or "scald" the young seedlings by subsequent irrigations.

Water Requirements

For full development lucerne requires some 600 tons of water to produce one ton of lucerne hay. It is obvious then that watering must be adequate. Lucerne is sensitive to abuse in watering and so irrigation must be uniform

Best results are achieved by maintaining growth, and irrigation—although an intermittent job—should be carried out regularly to induce continuous growth. Lucerne is usually irrigated by flooding and the preparation and layout of the land for irrigation are of basic importance. Methods are more or less standardized and what is know as the " border method " is in general use, and modified to suit variable conditions, it has been satisfactory in most cases.

The " border method " involves the division of the land into " bays " by small banks running down the slopes, i.e., across the contours; the land between the banks is levelled transversely and brought to a plane surface down the bays. The banks may be spaced from one-third of a chain to one chain apart and the bays may extend for a length of ten or twelve chains. In porous ground they should be shorter. Narrow bays are desirable when there is sidefall in the land, and the levelling across involves shifting of much soil from the higher to the lower side. The length of the bays governs the absorption, and some soils are so porous that a long run means great absorption and wasteful use of water and perhaps subsequent trouble through a rising water table.

Investigations regarding the best rate and frequency of watering for lucerne were conducted at the State Research Farm at Werribee some twenty-five years ago. Applications of irrigation water from 1-ft. per acre per annum to 4-ft. of water per acre were made and the frequency of water was varied by applying it in different rates and frequencies. The rates of watering were from 2 to 6 inches per watering.

The lucerne gave increasing returns with increasing quantities of water, but the increases were not proportional to the increases in applied water; the lucerne produced with the heavy watering was coarse and after a few years the stand began to thin out.

The best results per unit of water, were obtained from 2 ft. of irrigation water, applied in six waterings over the growing season. Usually this meant one watering between the first and second cut; two waterings between the second and third cuts, and one between the fourth and fifth. This prompted steady growth, produced lucerne hay of excellent quality, and was conducive to longevity in the stand.

It has been confirmed in many instances through the irrigation districts of the State, that 2 ft. of water is the best amount of water to use, and it should be given in moderate applications of about 4 in. each.

In those cases where water absorption is slow, the land may not take more than 2 inches per watering. In such cases a supplementary watering has been found effective. This means that a second watering is given a day or two after the first, while the water is still available to the block.

Lucerne ready for seed harvesting, Stuart Mill.

This second watering may be done in less time —the water will travel faster and spread better than during the first watering. If land is badly graded extra watering is likely to aggravate troubles, and lucerne suffers more from overwatering than underwatering.

Manuring

The investigations at the State Research Farm Werribee into the factors governing the production of irrigated lucerne included tests with all standard fertilizers and combinations

An excellent stand of lucerne at Rochester.

of fertilizer and with "super" and gypsum. These tests indicated that phosphatic manures were the important ones and that superphosphate was the best form to use. In extension of the Werribee experiments, test were made at Swan Hill, Rochester, Tongala, Stanhope and Cohuna and in all cases the same results emerged and the best returns were from the plots receiving heaviest dressings of superphosphate.

At Swan Hill, an annual application of 6 cwt. of superphosphate per acre trebled the production and in other centres, where 4 cwt. was the maximum applied the yields were doubled. In every case superphosphate alone in liberal quantities was the best fertilizer. The yields were carefully weighed and the benefits were maintained for several years.

Apart from the increased yields top-dressing with superphosphate produces many other benefits. It rejuvenates the plants and extends the useful life of the stand; the more vigorous growth of the lucerne suppresses weed growth. The manure promotes better winter growth and undoubtedly enhances the value of the fodder.

An unexpected result from repeated heavy dressings of "super" was revealed at Tongala; that was the improved permeability of the soil induced directly or indirectly by repeated annual applications of 4 cwt. of "super" per acre. In the experimental plots, the top-dressed strips extended across the bays, and alternated with unmanured plots. At the border of the plot receiving 4 cwt. of "super" and the adjoining untreated strip, a trench was dug. The unmanured plot was hard and dry, the visible roots went to a depth of less than 2 feet. On the manured plot immediately adjoining, digging was easy, the soil was moist to a depth of 6 feet and the roots had gone to that depth. This was a lesson of the greatest practical significance and whether cause or effect it represents a lasting effect on the physical condition of the soil.

Scarifying Established Stands of Lucerne

In the management of established lucerne the practice of scarifying the lucerne land in early spring was common. "Cultivate and top-dress" was the usual advice. When critical examination was made of the results of scarifying irrigated lucerne no benefit could be demonstrated and the practice has generally ceased. Scarifying will reduce the amount of annual grasses in the first cut of the lucerne, but all the advantages claimed for cultivation were properly attributable to top-dressing.

Lucerne makes splendid hay, but the quality of the produce is influenced by several factors. The vigour of growth governed by watering and

A well covered hundred-ton stack of lucerne at the State Research Farm, Werribee.

manuring is a first consideration. Moderate watering is best. Heavy waterings induce rank growth.

Cutting

The time of cutting is important and the right time for that is when the flowers are appearing, or the shoots of the succeeding growth are starting from the crown of the plant. Either or both may be a guide; in the first and last growths of the growing season, the new shoots are the better indication.

Usually when cutting is done as suggested there will be five crops per annum. The lucerne may be cut at an earlier stage and six cuts may be arranged, or the crop may be allowed to go to " full bloom " and four cuts taken off. The lucerne cut earlier is finer and gives excellent quality fodder. The mature lucerne is coarser in the stem, and when the plant is in full bloom the leaves are yellowing and beginning to fall.

Repeated early cutting has an adverse effect on the vigour of the plants and the delayed cutting is favourable, but having regard to all points, cutting at the intermediate stage of early bloom will produce good hay and conserve the vigour of the growing plant and it is recommended.

The effective curing of the hay is governed by the weather and calls for judgment to meet varying conditions. The objective should be to save the leaves. They contain most of the nutriment, but are easily shattered and lost by over-exposure to sun and rain. The loss of the green colour represents a loss of valuable qualities in the hay.

The usual procedure is to cut and allow the lucerne to lie in the swathe usually for a day, but in hot weather in the Northern districts the rake follows the mower very soon after cutting. The hay is raked into windrows and subsequently put into cocks. The intervals between operations should be governed by the weather, and because cocking hay involves much labour it is often omitted and from the windrow the hay may be gathered into heaps, with a dump rake. Hay loaders may be used to gather the hay from the windrows, but there is a risk of heating by stacking the hay while too moist. Incidentally the spreading of coarse salt on the hay while it is being stacked will reduce the risk of heating (20 lb of salt per ton of hay is recommended).

Grazing lucerne is common practice, and although abuses of grazing are conducive to degeneration of the stand, the effects will be modified if care is taken to avoid over-grazing. Grazing should be regulated. Rapid " feeding-off " with intervals for the plants to recover, is desirable and this means subdivision and rotation. As with hay cutting some five weeks between grazings coincides with the succession of growths of the lucerne and more frequent grazings drain the vitality of the plants. If the intervals between grazing are narrowed, the plants should be given occasionally longer respite from grazing to permit full leaf development. The droppings of the stock are, to some degree, compensation for the plant food abstracted by the plants.

Raking and cocking lucerne prior to carting.

Lucerne is grown successfully in widely scattered parts of the State. These areas could be extended with great advantage. The success obtained in the wheat areas, even in the Mallee is of particular significence. An outstanding example is presented at Antwerp, north of Dimboola, on the farm of W. N. Muntz. Over an extended period before the war he had sown lucerne on " Mallee fringe land " and had established it over hundreds of acres, completely altering the carrying capacity of his farm.

The procedure was to sow lucerne under cover of a wheat crop on fallowed land. Mr. Muntz stated that fallowing was a prerequisite for success. He favoured May sowing and considered 2 lb. of lucerne seed per acre as a desirable rate. The wheat was sown at the rate of 1 bushel per acre with 90 lb. of " super."

The marked response by lucerne to superphosphate top-dressing on the Murray River flats at Swan Hill is illustrated.

this State. It is a perennial, leguminous plant capable of producing a succession of growths of most nutritious fodder. It is adapted to varied soils and conditions. It thrives under irrigation, but it is foremost as a drought resistant plant. It will not withstand excessive wetness.

Extended preparation of the land for sowing is advised, and where irrigation is to be practised, the proper lay-out of the land is important to facilitate uniform watering, and to permit proper control of irrigation.

The lucerne at Antwerp was top-dressed in succeeding years with 1 cwt. of "super" per acre, and grazing was regulated. Making every concession, the land on which this is being done is no better than hundreds of thousands of acres of similar land, and lucerne is firmly established even on limestone ridges. The low cost involved in this development makes it a very practical means of improving and stabilizing farming in Mallee fringe areas.

Summary

Lucerne is a fodder plant of particular value and its culture could be profitably extended in

Maintenance of lucerne in a productive condition requires liberal manuring with superphosphate and adequate watering if irrigation is necessary. Lucerne is best utilized by cutting and conservation of the fodder as hay. The time of cutting should be the early bloom stage. This gives maximum yields of good hay and conserves the strength of the plants. It is commonly grazed and it will withstand this if reasonable care is taken not to over-graze, and the vitality of the plant is maintained by top-dressing.

Successes with lucerne in the drier areas of the State should encourage many farmers in the lower rainfall districts to try it.

SHADE FOR FARM STOCK

One of the first essentials for animals during the extreme heat of summer is ample shade from the direct rays of the sun. This applies to animals out grazing, as well as those kept in yards or travelling in trains, &c. When clearing a paddock for sowing down in wheat, it is advisable to leave a few trees for shade for sheep when they are turned on to the stubble, and it will be noticed how they take advantage of this protection from the sun.

Pigs are very susceptible to extreme heat, especially when fat, and considerable losses occur in transit in summer if no overhead shade is provided. A few branches placed over the top of a motor truck will generally prevent this loss.

Some cattle with patches of white skin such as Ayrshires, Friesians, and some Shorthorns are liable to a complaint termed "Photo-sensitization," which is caused by the direct rays of the sun acting on the unpigmented skin when the cattle have been grazing on trefoils or clovers. The skin will crack and lift on the white patches which should be covered with grease and lampblack, or the animals kept out of the direct sunlight until the condition is cured. Sheep are also liable to this trouble which principally affects them about the head and ears.

Poultry require shade during hot weather otherwise mortality may be heavy. Natural shade provided by trees and shrubs is preferable to sheds, as the trees allow the air to circulate freely and keep the stock much cooler. A plentiful supply of clean drinking water is essential.

[Contributed by the Live Stock Division.]

SOME PIG-FEEDING PROBLEMS

By L. A. DOWNEY, H.D.A., Pig Expert

A VICTORIAN pig farmer complained recently that, although he was feeding his pigs "the scientific way," he was not making a profit. Apparently this farmer had applied the science of nutrition, but not the science of economics to his pig raising enterprise.

As raising pigs is a business, their feeding is more a matter of economics than of nutrition, and, within certain nutritional limits, the major factor determining the profit or loss of the business is the cost of the bulk of the diet in relation to the cash value of the pig meat which it produces.

It is relatively easy to make a profit from pig raising when the major part of the food used is available on the farm as a by-product from some other industry, and has no cash value except when marketed through pigs. This is often the case with separated milk and rejected fruit and vegetables, but when the bulk of the pig food has to be purchased or transported to the farm, careful consideration must be given to its economic value as well as its nutritive value.

Having done this, it is most desirable to consider the provision of supplementary foods, small quantities of which are required to complete the diet, and to get the full value from the major components of the diet. These supplementary foods may include separated milk or meatmeal, lime and green food, depending on the nature of the major part of the diet. The supplementary foods should be considered less for their own economic value than for their nutritive value, and for their effect on the efficiency of the major food used in the diet.

For example, in a diet consisting of 90 parts of wheat, 8 parts meatmeal, 2 parts ground limestone, and ½ part of salt, together with some green food and drinking water, the major part is wheat, and on its cost, more than anything else, depends the cost of producing the pigs.

Using the above diet to produce a 200 lb. live-weight baconer from its conception, the food requirements and their present costs on the farm to feed would be approximately as follows:—

	£	s.	d.
12 bushels of wheat @ 4s. per bushel .. =	2	8	0
64 lb. of meatmeal @ £13 a short ton =		8	3
16 lb. of ground limestone .. .. =			8
4 lb. salt .. .. =			4

The wheat is the biggest single item in the cost of the food, and a variation of 6d. per bushel in its price would vary the food cost on the baconer by 6s.

The meatmeal, although costing more than twice as much per ton as the wheat, amounts to less than one-fifth of the cost of the wheat used in this diet.

The real value of meatmeal is its contribution of nutrients which are present in wheat only in very limited quantities. If the meatmeal were omitted from the above diet to save its cost of 8s. 3d., the time taken to grow the 200 lb. baconer would be extended by several weeks, and the amount of wheat consumed would be increased from 12 to possibly 18 bushels, thus raising the cost of wheat by 24s., and increasing the net total cost of food consumed by 15s. 9d.

The principle illustrated with meatmeal applies in varying degrees to the use of the other supplementary foods—lime, salt and green food.

Where separated milk is available as the major part of the diet, as on many dairy farms, meatmeal is not required as an accessory food, because the separated milk contains similar properties to those of meatmeal, but wheat or other cereals can be used to advantage as a supplementary food to the milk.

Ground limestone and salt in the proportion of 4 to 1 are necessary in a diet which consists largely of cereal grains or meals, but are not necessary where pigs have an abundance of separated milk, buttermilk or whey. However, where the supply of these milk by-products is very irregular, and there is doubt about their supplying the necessary quantity of lime, the lime and salt mixture can be provided in a trough fixed in a sheltered place where the pigs have continual access to it. Under these conditions, the pigs will not eat more than they require of the lime-salt supplement, as it is not very palatable. This self-feeding method can also be used for the lime-salt supplement when pigs are on a diet consisting chiefly of grain, but if it is desired to hand-feed it in their daily ration, about 1 oz. daily is required for pigs from weaner to baconer weight, and for dry sows and breeding boars, and 2 oz. daily for sows suckling litters.

The value of lime as a supplement to a diet consisting largely of cereals is not so spectacular as that of meatmeal, but the adverse effects of its absence from the diet become manifest when the lime deficiency has continued for a lengthy period. For this reason, pig raisers frequently fail to associate cause and effect in lime deficiency.

A deficiency of lime in the diet causes some slowness of growth in young pigs, but this is not always very noticeable nor very serious, its more serious effects being the reduced production of breeding sows, through farrowing small litters, many dead or weakly pigs at birth, and pigs of small size at birth which fail to reach a fair standard of growth rate to baconer weight.

Another common result of lime deficiency in the diet of pregnant sows is their restricted udder development, and small yield of milk, which limits the growth of their litter during the suckling period.

The effects of lime deficiency are cumulative over successive generations of pigs.

Considering all these possible economic losses, and the low cost of lime and the ease with which it can be fed to pigs, its use should be considered as an inexpensive insurance.

Green food is a very important supplement to the diet of pigs. Except in the case of mature, pregnant sows, it will not replace much other food in the diet, but its value lies in providing some nutrients, including vitamins, minerals and proteins which are essential to health, growth and reproduction, but which are absent or present only in inadequate amounts in foods commonly used for pigs.

The inadequate supply of green food for pigs is considered to be the greatest single factor limiting their fertility, milk production, growth and resistance to infection by disease-producing organisms.

When it is not practicable to provide succulent green food either freshly cut and hand-fed or grazed by the pigs, substitutes may be used such as lucerne or meadow hay or chaff of green leafy quality, or even green cereal hay or chaff. However, as it is doubtful if there is any entirely satisfactory substitute for fresh young greenstuff or pasture, every effort should be made to provide them, even if it means the establishment of a small irrigation plot near the piggery or in the home garden.

TOMATO VARIETY INVESTIGATIONS IN THE GOULBURN VALLEY—1943-44

By C. E. COLE, B.Agr.Sc. ; R. S. HARPER, B.Agr.Sc. ; and R. A. MULLETT, B.Agr.Sc.

The experiments described in the following pages show that the tomato varieties Tatura Dwarf Globe and Tatinter, in the Goulburn Valley, provide a better return to the grower, due to the higher percentage of canning quality tomatoes they produce, than the standard variety. The varieties Burwood Wonder, Fiedler's Long-keeping Dwarf and Watt's Long-keeping Dwarf yield almost as well as Tatura Dwarf Globe and Tatinter, but the percentage of canning quality fruit from these three varieties is much lower. The variety Queen is not suited to conditions in the Goulburn Valley.

DURING the last three years, the tomato industry in the Goulburn Valley has expanded considerably. In 1941-42, approximately 1,000 acres of tomatoes were grown there, while in 1943-44, over 3,000 acres were handled. War-time demand is particularly for canning tomatoes for the services. To obtain more precise information regarding the yields, quality and relative performance of some of the newer tomato selections developed by the Victorian Department of Agriculture, replicated trials were carried out in 1943-44 in this area. The object of the investigations was to test and compare five selections and varieties of tomatoes with a standard variety under commercial conditions in the Goulburn Valley with particular regard to yield and canning quality.

The standard variety was *Burwood Wonder*. This tomato is extensively grown in the Goulburn Valley and usually gives a fairly high yield per acre. It is one of the flat corrugated types usually referred to as "Chinese." The fruit is much wrinkled and the percentage of canning fruit is usually low.

Against the standard the following varieties were tested:—

1. *Tatura Dwarf Globe*, a single plant selection from a field planted to South Australian Dwarf. Rigorous selection over a period of years has resulted in a smooth, round canning type tomato. This variety was released by the Department of Agriculture in 1942.

2. *Tatinter* (Synonym:—Selection B). This variety is thought to be the result of a chance cross between Burwood Wonder and Intermediate. Selection work on the variety has been carried on for several years at the Research Station, Tatura, and has resulted in a large, slightly flattened, almost smooth canning quality tomato.

3 and 4. *Watt's Long Keeping Dwarf* and *Fiedler's Long Keeping Dwarf*. Both of these are selections of South Australian Dwarf.

5. *Queen*. A canning type tomato (i.e., smooth and round), grown extensively in the Bendigo district.

Layout of Plots

The varieties were tested by replicated trials each plot consisting of eight plants of each variety, replicated six times, the trial being repeated at six different sites throughout the Goulburn Valley, on soils typical of the area, and under the care of reputable tomato growers. Each plot was laid out on a different plan, but all were latin square designs to enable statistical analyses to be carried out.

Unfortunately, due to a number of reasons, including the difficulty of obtaining adequate records, two of the plots (Nos. 1 and 4), had to be abandoned in the analysis of the results.

Plot No. 2 was situated at Tatura on a soil typical of the district, being a somewhat shallow, reddish silty loam. This land had been used for cabbage and tomato growing during the preceding three years.

Plot No. 3 was located at the Horticultural Research Station, Tatura, and was unavoidably on a heavy clay loam which could not be regarded by any means as ideal for tomato growing.

Plot No. 5 was located near Shepparton and the soil here was a light reddish well drained loam. It had been used for tomato production over the past two years.

Harvesting experimental tomato plots, Horticultural Research Station, Tatura.

Plot No. 6 was situated near Shepparton on a well-drained, dark sandy loam. This ground had, prior to planting, been under irrigated pasture for some years.

All cultural operations were carried out by the individual grower as his experience indicated. Planting took place between the 14th and 20th October, 1943, this being the usual time for the cannery crop. All the seedlings were raised at the Research Station.

Picking and Sorting

The first pick was taken during the first half of January, 1944, and thereafter the plots were picked at approximately weekly intervals.

The fruit from each unit (i.e., eight plants), was picked separately, and the total of each variety from each plot bulked. All ripe fruit from each plant was picked and inspected before, and sorted after, road transport for some distance.

Sorting was carried out on the basis of the standards laid down by the Federal Department of Commerce and Agriculture and the Victorian Department of Agriculture for factory tomatoes for the 1943-44 season, which were as follows:—

Canning Grade shall consist of tomatoes which are sound, clean, free from disease, practically free from blemishes, firm, mature, well coloured, of good shape and smooth skin, not less than 1¾ inches in diameter.

Standard Grade shall consist of tomatoes which are not acceptable as Canning Grade, but shall be well coloured, and free from serious damage from any cause.

Culls—all other tomatoes.

Results

Tables I. and II. show the results from each plot as the average weight of fruit from six eight-plant units in pounds. The total yields are calculated in cases per acre, taking 48 lb. cases as a basis. Table III. shows the total yields from all four plots.

In Plot No. 2, the differences between Burwood Wonder, Tatura Dwarf Globe, Tatinter, Fiedler's Dwarf and Watt's Dwarf are not statistically significant, but Burwood Wonder, Tatura Dwarf Globe, Tatinter and Fiedler's Dwarf are significantly higher yielding than Queen.

TABLE I.

Yields from Plot Nos. 2 and 3.

Variety.	Plot No. 2.		Plot No. 3.	
	Average of Six 8-Plant Units.	Cases per Acre.	Average of Six 8-Plant Units.	Cases per Acre.
	lb.		lb.	
Burwood Wonder ..	50·17	759	59·42	674
Tatura Dwarf Globe	51·00	771	58·92	668
Tatinter	51·17	774	66·58	756
Watt's Dwarf ..	45·58	690	55·33	628
Fiedler's Dwarf ..	50·25	760	57·42	651
Queen	38·67	585	42·50	482
Total	286·84	4,339	340·17	3,859
Mean	47·81	720	56·69	643

In Plot No. 3, the differences between Burwood Wonder, Tatura Dwarf Globe and Tatinter are not significant, but these are significantly higher yielding than Watt's Dwarf, which is significantly higher yielding than Queen. Fiedler's Dwarf is not significantly different in yield from the four first-named varieties, but is higher than Queen.

In Plot No. 5, the differences between Tatura Dwarf Globe, Tatinter, Fiedler's Dwarf and Watt's Dwarf are not significant,

but the first three are significantly higher yielding than Burwood Wonder and Queen, there being no significant difference between the latter two varieties. The explanation of the unexpectedly low yield from Burwood Wonder is not known.

In Plot No. 6, the differences between Tatura Dwarf Globe, Burwood Wonder, Tatinter and Fiedler's Dwarf are not significant, but the first two varieties are significantly higher yielding than Watt's Dwarf, which, in turn, is significantly higher yielding than Queen, as are the other four varieties.

TABLE II.

Yields from Plot Nos. 5 and 6.

Variety.	Plot No. 5.		Plot No. 6.	
	Average of 6 x 8-Plant Units.	Cases per Acre.	Average of 6 x 8-Plant Units.	Cases per Acre.
	lb.		lb.	
Burwood Wonder ..	51·42	583	82·17	1,065
Tatura Dwarf Globe	67·75	769	86·75	1,124
Tatinter	66·75	757	79·33	1,027
Watt's Dwarf ..	58·58	665	69·58	902
Fiedler's Dwarf ..	63·67	723	78·17	1,016
Queen	50·83	575	59·67	774
Total	359·00	4,072	455·67	5,908
Mean	59·83	679	75·94	985

Table III. shows the sum of the yields from the four plots. In this case, the differences between Tatura Dwarf Globe, Tatinter and Fiedler's Dwarf are not significant, but these three varieties and Burwood Wonder are significantly higher yielding than Watt's Dwarf and Queen, while Tatura Dwarf Globe is significantly higher yielding than Burwood Wonder.

TABLE III.

Total Yields of Plot Nos. 2, 3, 5 and 6.

Variety.	Total.	Average of Twenty-four 8-Plant Units (lb.).	Cases per Acre.
	lb.		
Burwood Wonder ..	1459·0	60·79	771
Tatura Dwarf Globe ..	1586·5	66·10	839
Tatinter	1583·0	65·96	837
Watt's Dwarf ..	1374·5	57·27	727
Fiedler's Dwarf ..	1497·0	62·38	792
Queen	1150·0	47·92	608
Total	8650·0	360·42	4,574
Mean	1441·6	60·07	762

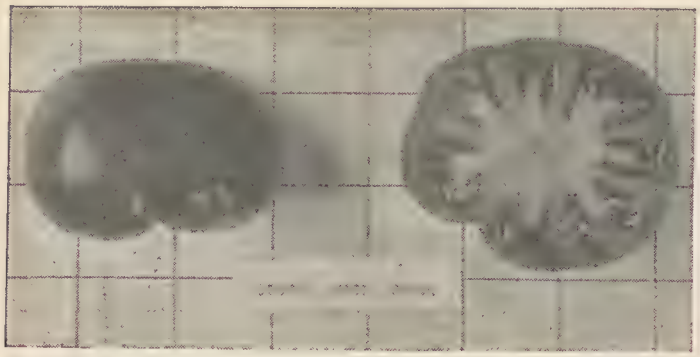
The foregoing tables complete the comparison of the varieties from purely a yield viewpoint, and now it is necessary to compare the varieties with regard to their canning quality. Table IV. summarizes the figures of canning and standard grade tomatoes from each variety.

The difference in canning yield between Tatura Dwarf Globe and Tatinter is not significant, but both these varieties have a significantly higher canning yield than Queen, Fiedler's Dwarf, Burwood Wonder and Watt's Dwarf, the difference between these four varieties not being significant, while the yields of standard grade fruit show that the difference between Burwood Wonder, Fiedler's Dwarf,

TABLE IV.

Showing the crop totals for all plots, standard plus canning fruit (marketable), and canning fruit, these also being shown as percentages.

Variety.	Total Crop.	Total Canning.	Per Cent Canning.	Total Marketable.	Canning as Per Cent of Marketable.
	lb.	lb.		lb.	
Tatura Dwarf Globe	1586·5	322·0	20·9	1063·0	31·2
Tatinter	1583·0	390·5	24·7	1136·0	34·4
Fiedler's Dwarf	1497·0	216·0	14·4	984·0	22·0
Burwood Wonder	1459·0	188·0	12·9	1036·5	18·1
Watt's Dwarf	1374·5	196·5	14·3	910·0	21·6
Queen	1150·0	246·5	21·4	759·0	32·5
Total	8650·0	1569·5	..	5888·5	..
Mean	1441·6	261·6	18·1	981·4	26·6



Tomato fruits of the Burwood Wonder type.

Tatinter, Tatura Dwarf Globe and Watt's Dwarf is not significant, but the yield of Queen is significantly less than all other varieties.

Table V. shows the monetary return per acre from each of the six varieties had the fruit been sold at the ruling cannery prices during the 1943-44 season, i.e., 6s. per case (48 lb.) for canning quality fruit, and 3s. per case for standard grade fruit.

Discussion

These trials were carried out under conditions thoroughly representative of the range of soils and culture of the Goulburn Valley. The above tables, except Table V., have been statistically analysed and the figures show that the variety Queen in practically every case, gives a significantly lower yield than any of the other varieties, although the percentage of canning fruit produced is quite good. In addition, the habit of growth of the variety is large and sprawling with a decided lack of foliage and these factors, together with a tendency of the fruit to split radially, make it unsuitable for this area.

There does not appear to be much to choose between the standard Burwood Wonder, Fiedler's Dwarf and Watt's Dwarf, although the latter seems to be the poorest of the three in most cases. No trials of keeping qualities of any of the varieties were made. Burwood Wonder gave a fairly good yield, as was expected, but over the four plots was inferior to Tatura Dwarf Globe and Tatinter.

Tatura Dwarf Globe has upheld its reputation as a canning variety in the Goulburn Valley. The comparatively high reject figures associated with long haulage under commercial conditions are related to the thinness of the skin. However, the variety was released by the Department of Agriculture on the recommendation that it was to be processed locally, and thus not subjected to long transportation by road or rail. Further selection work to improve its carrying qualities is being carried out at the Research Station, Tatura.

Tatinter shows up as one of the outstanding varieties in the trial and, as it has a number of the advantages of Tatura Dwarf Globe without some of its disadvantages, such as "green shoulder" and thinness of the skin, this variety will no doubt find for itself a place in the tomato industry in the Goulburn Valley in the next few years.

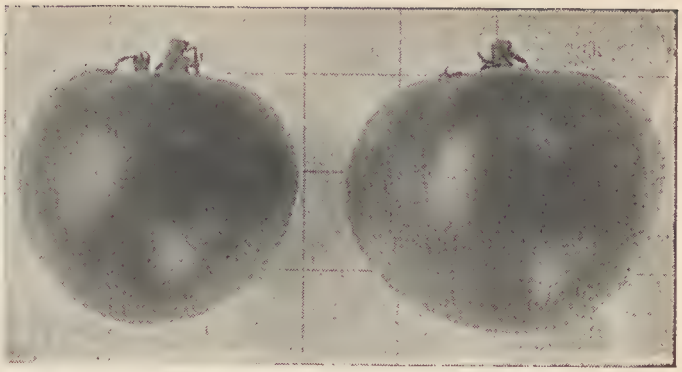
Although trials such as these must be repeated over a number of years to obtain a true

TABLE V.

Showing monetary return per acre possible from all varieties.

Variety.	Canning.		Standard.		Total Return per Acre.
	Number of Cases per Acre.	At 6s. per Case.	Number of Cases per Acre.	At 3s. per case.	
		£ s. d.		£ s. d.	£ s. d.
Tatura Dwarf Globe	176	52 16 0	387	58 1 0	110 17 0
Tatinter	206	61 16 0	394	59 2 0	120 18 0
Fiedler's Dwarf	114	34 4 0	406	60 18 0	95 2 0
Burwood Wonder	99	29 14 0	449	67 7 0	97 1 0
Watt's Dwarf	104	31 4 0	377	56 11 0	87 15 0
Queen	130	39 0 0	271	40 13 0	79 13 0
Total	829	248 14 0	2,284	342 12 0	591 6 0
Mean	138	40 3 0	381	57 2 0	98 11 0

picture of the varieties under a range of seasonal conditions, the results are supported by commercial experience and the publication of this progress report seems justified. These trials will be repeated during the 1944–45 season, but the selections Fiedler's Dwarf and Watt's Dwarf, together with the variety Queen, will be replaced by other selections or varieties which, it is hoped, will prove more profitable than these three.



Fruits of Tatura Dwarf Globe tomato.

Conclusions

The trials show that both Tatura Dwarf Globe and Tatinter in the Goulburn Valley are consistently at least equal to, or better than the standard Burwood Wonder, when yield alone is considered, and that both varieties are superior to Burwood Wonder in regard to canning quality, and provide a better financial return.

There is little difference between Burwood Wonder, Fiedler's Dwarf and Watt's Dwarf, although of the three, the latter is inferior in yield. In canning quality, all three varieties are of the same low standard.

Under the climatic conditions, planting time and cultural practices existing in the Goulburn Valley during the 1943-44 season, the variety Queen is definitely not suited to the district.

Acknowledgments

The help and co-operation of district growers over the season is appreciated, particularly that of Messrs. T. Trevaskis, Shepparton; Russl and Patone, Orrvale; H. Ishmail, Lemnos, and L. Mechkaroff, Tatura.

Accredited Brucellosis-free Herds (Swine)

The following herds of pigs have been accredited as free of swine brucellosis (contagious abortion of pigs) by the Department of Agriculture.

An accredited brucellosis-free herd of pigs is one in which all animals therein have been subjected to two successive blood tests for brucellosis with negative results at intervals prescribed by the Chief Veterinary Inspector of the Department.

In order to remain accredited, a semi-annual or annual re-test (as determined by the Chief Veterinary Inspector) of all animals in the herd shall be conducted. If at a re-test any animal fails to give a negative reaction to the test, the herd shall not be declared brucellosis-free again until two tests of the complete herd have been carried out with negative results.

Full particulars of the Accredited Swine Brucellosis-free Herd Scheme and application forms may be obtained from the Chief Veterinary Inspector, Department of Agriculture, Melbourne, C.2.

Name.	Address.	Name.	Address.
Abrahams, L. J. ..	Red Hill South	Hawtin, I. E. and F. ..	"Rossmoyne," Colac
Baker, J. J.	Bannockburn	Haywood, Dr. A. R. ..	Hastings
Beechy, K.	Pomborneit	Horn, L. A.	Leongatha North
Bidgood Bros	Staghorn Flat	Longerenong College ..	Dooen
Bodey, A. A.	"Bonnyview," Dooen	Noble, T. M., and Sons ..	Maffra
Bright, George H.	Dumbalk	Northcote Children's Farm	Bacchus Marsh
Buller, R. A. .. .	Beaconsfield	Rintoul, J. T. C. ..	Glengarry
Castle, L. H.	Clarinda	Roy, W. A.	Morrell's Hill, via Boolarra
Critten, H. S.	Dumbalk	State Experiment Farm	Rutherglen
Dookie Agricultural College	Dookie	Trenery and Soderlund ..	"Promview," Foster
Doornbusch, John L. ..	"Starpark," Nhill	Trigg, A. J.	Bungaree
Ellwood, A. H. ..	Paschendaele	Trigg, N. H.	Bullarook
Fairchild and Clutterbuck	Tinamba	Tweddle, J. T.	"Winlaton," Shepparton
Hamblin, A. T., and Sons	Toolleen	Warry, A., and Sons ..	Delburn
Harrison, C. T. ..	"Eastside" Stud, Pomborneit	Whelpton, B.	Whittlesea North
		White, G. W.	Boolarra South

Weed Control in Carrot Crops

By C. E. COLE, B.Agr.Sc.*; A. C. DOERY, B.Agr.Sc.†; D. M. McALPIN, B.Agr.Sc.‡

A preliminary note on the use of oils of the power kerosene type to destroy weeds in carrot crops without injury to the carrot plants was published in this Journal for December, 1943. Since that date, a good deal of experimental work has been done, and many hundreds of acres of carrots have been weeded successfully in this way. While Victorian experience of the new method is not yet extensive enough to reveal all its possibilities, both good and bad, it is described here in the knowledge that the benefits are great and the risks small, and that many carrot growers will be helped to better and cheaper production by its use.

CARROT crops are usually grown in fertile soils in districts of good rainfall or under irrigation. Weeds are very aggressive here, and their control in a carrot crop by cultivation and hand-weeding requires much labour and may cost up to £30 an acre, especially on highly-priced land where crops are grown in rows often as close as 9 inches, and mechanized cultivation is difficult. Thorough preparation of the soil before planting, and early weeding of the crop are most important.

Early in the growth of the crop, it is possible to spray the rows of carrots with a *special kind* of kerosene which will destroy the weeds and leave the carrots unharmed. Little or no hand-weeding of the rows is then necessary, so that the young carrots receive no check as they do from the inevitable disturbance of their roots by hand-weeding. Thinning of the carrots themselves is still necessary if the stand is too thick. Apart from the labour saved by the spray method of weeding, it has the big advantage that large areas can be covered quickly, so that the weeding can be done at the proper time.

The kerosene weedicide spray is suitable only for carrot crops and crops closely related botanically to carrots, and having a growing period sufficiently long for the kerosene taint to disappear, such as parsnips. It cannot be used successfully on beetroot or other vegetable crops. It will kill in the seedling stage, practically all grasses and weeds, except weeds of the carrot family, such as wild carrot, hemlock and aniseed, which are not common in cultivated areas. The effects of the spray should be clearly visible in 24 hours. The kerosene is actually absorbed by the carrots, but does not injure them. The taint, however, persists for up to 90 days after spraying, depending on the amount of kerosene applied, and the rate of growth, slow-growing carrots retaining the taint longer than rapidly-growing carrots. The taint becomes more noticeable on cooking. The kerosene spray has no permanent effect on the soil, but appears to prevent germination of weed seeds for about six weeks. It also destroys aphis on the carrots, and discourages their return for a time.

Spray weeding is simple, but of course there are precautions to be observed and a best technique to follow. No carrot grower who observes the information given below need lose his crop through weeds, no matter how short of labour he may be.

The Spray to Use

Growers are strongly advised to use a proprietary preparation known as "Kerosene Weedicide," marketed by Pool Petroleum Proprietary Limited, at the request of the Victorian Department of Agriculture. Victorian orders must be lodged with the Melbourne office of the company, and the weedicide is supplied only f.o.r. or f.o.b. Melbourne. *The weedicide cannot be obtained from country depots of the company.* It is available only in 44-gallon drums, at a cost of one-farthing per gallon more than the ruling cost of power kerosene.

This recommendation is made because of three facts. The first is that Departmental experiments have shown, that to give effective killing of weeds without damage to the carrots, a kerosene must contain between 12 and 15 per cent. of certain chemical compounds, naturally present in all kerosenes and measured by treating the kerosene with concentrated sulphuric acid. A kerosene which contains less than 12

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All of the Victorian Department of Agriculture.

Foreground—Kerosene-sprayed carrot crop; no hand-weeding required. Background—Weeds can soon swamp a young carrot crop.

per cent. of these compounds, as lighting kerosene does, will not destroy the weeds, while one which has more than 15 per cent. is likely to kill the carrots as well as the weeds. The second fact is that power kerosene, which *may* contain the right proportion of effective compounds, varies from shipment to shipment, and frequently contains a much higher proportion than is safe. The third fact is that there is no simple field test, other than actual trial on a carrot crop, by which unsuitable kerosene can be detected. The grower who uses ordinary untested power kerosene *may* succeed. On the other hand, he is just as likely to destroy his crop.

If special circumstances require the use of ordinary power kerosene, *each drum* should be tested by spraying a sample on a short length of row, and observing the effects 24 hours later. If the results are not satisfactory, nothing can be done except to obtain the "Kerosene Weedicide". This is simply kerosene which has been chemically tested to determine the percentage of the active compounds present, and, if necessary, blended to give the proper proportion. It is therefore safe to use, and this safety is well worth the extra farthing per gallon asked for it.

Other oils than kerosene have selective properties, but kerosene is the safest, cheapest, and most readily available.

Preparation of the Spray

No preparation of the spray is necessary—the proper kerosene can be sprayed on the crop *neat*. It is also possible to use kerosene by emulsifying it with soap and water, but, while this may allow a slightly smaller quantity of kerosene to be used, the extra cost and trouble of preparing the spray and of distributing the extra bulk due to the water outweigh this saving. The kerosene-emulsion method is not recommended.

When to Spray

Spraying may be done after the carrots have developed at least one true or "fern" leaf, and preferably before they have more than four "fern" leaves, but definitely at least three months before the crop will be ready for harvest. Carrots sprayed later than this will retain a flavour of kerosene which cannot be removed. Such carrots will be commercially valueless. It is usual to follow the spray with a rapid hand-weeding about a week later to destroy any weeds missed by the spray.

It is desirable to spray the crop as early in its life as possible. As a general rule, the older the weeds become, the harder they are to kill. Young weeds are easily killed; older weeds may be damaged, but most will recover. Therefore, spray while the weeds are small. There is some evidence to suggest that the crop can be sprayed, if necessary, before the carrots have developed any true leaves—i.e., in the seedling or cotyledon stage—without permanent damage. Some or the seedlings may be killed, but the majority will recover and make normal growth. The advantages of this early spray are that all weeds, being also very small, are completely killed, and that any aphis attacking the carrots are destroyed before they can cause serious damage. Generally, however, the risks of damage through spraying at this stage are greater, and in most cases, spraying in the 1 to 4 "fern-leaf" stage gives most satisfactory results.

Spraying twice, to kill two crops of weeds, although it has been done under special circumstances, is not recommended. The risk of a taint persisting in the carrots to maturity is too great.

Growers are again warned against late spraying of the crop. Big weeds cannot be killed by normal spraying, only checked. Much more spray is required for bigger weeds. Above all, the danger of carrying forward a kerosene taint is greater as the carrots become older.

Effects of Weather

The effects of weather on kerosene weedicide are not very marked. There appears to be risk of damage if spraying is done in very hot

weather, and, therefore, growers are advised to spray in mild weather or the cool of the morning. Cold weather slows down the action of the spray a little. Rain after spraying will not alter the result. Strong wind will cause uneven spraying.

Equipment

The ordinary knapsack spray is suitable for small to medium sized areas. Spraying can be done with it at a moderate walking pace. The versatile 3 h.p. garden tractor can be fitted with spray equipment and is suitable for medium-sized areas, particularly where row spacing is less than 18 inches. Larger power sprays for attachment to tractors for spraying large areas can be purchased or improvised. Orchard power sprays can be fitted with a boom for row spraying, but should be tractor drawn to maintain a uniform speed and avoid mechanical injury to the crop. The higher the pressure used the better is the penetration of the spray into dense weed-growths.

The ordinary cyclone nozzle, fitted with a disc to give either a cone or fan-shaped spray, is most effective. A fine, misty spray gives good coverage and is economical of kerosene. The nozzles should be placed directly above each row and pointing straight downwards. Usually a height of six inches above the plants will give sufficient width of jet.

All spray equipment should be provided with a quick-acting shut-off valve, so that if it is necessary to come to a standstill in the crop, that part of the crop will not receive too much kerosene. This would reduce the risk of damage to the carrots in which the kerosene taint would last longer if they were oversprayed.

Saving Kerosene

Spray weeding is much cheaper than hand-weeding, but is still fairly costly, more so than horse or mechanized cultivation. Further, kerosene is a vital fuel in our wartime economy which must be imported at considerable risk due to danger of enemy interference. It is essential therefore that it be used with the utmost economy consistent with good results.

Where rows are more than 12 inches apart and the rows of carrots can be seen easily, first the weeds between the rows can be destroyed by cultivation, working as close to the rows as possible, then the remaining strips can be sprayed to kill the weeds in and near the rows. This method reduces the quantity of kerosene required to about one-half. If the rows of carrots are hard to see because of weeds, it will be necessary to spray along the rows by hand, later cultivating between the rows when the weeds have wilted and exposed the still-green carrots. Where a 4-row seeding and cultivation are used, only every fourth row need be sprayed to act as a guide row for cultivation. Where rows are less than 12 inches apart, the cheapest way is to spray the whole area.

Quantity of Spray Required

The quantity of kerosene-weedicide required per acre depends on the amount of weed growth and the method of spraying. For the strip spraying of carrots in 18-inch rows, 20 to 50 gallons per acre may be enough with efficient equipment. When the whole area is sprayed, up to 80 gallons per acre may be necessary. These figures refer to the cropped area. For the area actually wetted, 80 gallons per acre is a satisfactory application.

Too little spray will not destroy the weeds. Heavy spraying will taint the carrots for a longer period, and, besides, is uneconomic. Use as little spray as will give a good coverage of weeds.

Conclusion

Many hundreds of acres of carrots were sprayed successfully with kerosene for weed control in Victoria last season, but the method

The power kerosene-sprayed plot on right shows complete destruction of the weeds without damage to the carrots.

[*Continued on page* 499.

POULTRY FEEDING TESTS AT WERRIBEE

By W. O. PEDERICK, Assistant Poultry Expert

The Department of Agriculture over the past twenty-three years has conducted a large number and variety of poultry feeding tests at the State Research Farm, Werribee. The object of these tests has been to find methods of feeding that give the best results for egg production under conditions similar to those existing on commercial poultry farms. The birds used each year are White Leghorn and Australorp pullets, and when these birds are divided into the different pens, their age, breeding, and quality are taken into consideration to ensure that as far as possible no pen has an advantage over another.

A LARGE laying shed 120 feet long by 20 feet deep divided into ten pens, with accommodation for 50 birds in each pen, has been used exclusively for test work. There is no outside run. A little over four square feet of floor space is provided for each bird. A careful record is kept of the amount of food consumed and the number of eggs laid by each pen each day.

At the conclusion of each test the cost of food is arrived at by taking the wholesale prices of the different foodstuffs as published in the press each week, and all eggs laid are valued at the highest wholesale price for eggs each week. No deductions are made for marketing charges, which makes the return over food cost appear rather high, but this method is considered the most satisfactory for comparative purposes, as those charges would vary on different farms in different localities.

The tests commence on the 1st of April of each year and are extended for a period of approximately 12 months, as tests which cover only a portion of the year may be misleading. In view of the fact that these tests have covered such a long period and over 9,000 birds have been used, the results should be fairly conclusive.

Many different foods and systems of feeding have been tried and much valuable information on average monthly production, palatability, and suitability of foods, &c., has been tabulated.

The first test in 1921-22 was to compare the value of oats and barley with wheat as a food for egg production. During that year wheat was high in price, reaching 9s. per bushel, while oats and barley were only 3s. to 3s. 6d. per bushel. The birds receiving oats only as a grain averaged 170 eggs per bird, and those on barley 144 eggs per bird, those on wheat 150 eggs, and those on mixed grain (wheat, oats and barley) 157 eggs per bird.

This test showed that Algerian oats (not hulled) is a thoroughly satisfactory food and suitable for more general use. Although barley is the least valuable of the three cereals as a food for egg production, a fair percentage may be added to the grain ration when the price is reasonable.

Free Choice Feeding

Many tests have been conducted with a system known as " free choice feeding," where the birds are allowed to choose for themselves the foods they wish to eat. The different meals and grains are placed in separate hoppers and are available to the birds continuously. Much valuable information on the palatability of foods has been gained from these tests. Palatability plays an important part in poultry feeding, because the success of the poultry farmer depends very largely on the amount of food his birds can consume and turn into eggs. If the consumption of food is limited because it is unpalatable, egg production will be affected and profits reduced. It has been noticed that the grains—wheat, oats, maize, and barley—are preferred to the dry meals—bran, pollard, meatmeal, &c. The preference for the different grains is usually in approximately the following proportions:—wheat (4 parts by weight), oats 2 parts, maize 2 parts, barley 1 part.

Green Feed

The value of green feed for laying pullets has been clearly demonstrated. Soaked lucerne chaff and sprouted oats were tried as substitutes for green feed as a control pen. The conclusion drawn from the test was that although soaked lucerne chaff and sprouted oats are better than nothing they are but poor substitutes for green feed. Although the surviving birds in the "no green feed" pen laid reasonably well, the death rate was particularly high. The work of providing a regular daily supply of succulent green feed is a big item on a commercial poultry farm, but it is considered to be the most economical method of keeping the birds in good health.

Meatmeal and Dried Buttermilk

Various tests have been conducted with meatmeal and dried buttermilk to see which would give the better result as a protein food. With dry mash, dried buttermilk seems to have given the better results, but with wet mash the difference is very slight. The highest egg yield recorded for a pen—211 eggs per bird—was produced by a pen of 60 White Leghorns which were fed on a dry mash consisting of equal parts by measure of bran and pollard with 10 per cent. dried buttermilk added. Although dried buttermilk contains less protein than meatmeal, it certainly adds to the palatability and probably to the digestibility of dry mash. However, either of these protein foods will give satisfactory results, and a choice can be made according to the price and availability.

Meatmeal feeding tests conducted during the years 1938-40 with both wet and dry mash showed that the best results were obtained when a bran and pollard mash containing 7½ per cent. meatmeal was fed in conjunction with mixed grain and a plentiful supply of succulent green feed. With less liberal or poorer quality green feed more meatmeal is advisable. In such cases 10 per cent. is recommended.

Soaked Grain

During the years 1936-38 the soaked grain system of feeding was tested against the usual wet and dry mash. In most instances the birds which were fed on soaked wheat or soaked mixed grain laid reasonably well, but, owing to the extra labour involved in the soaking and stirring of the grain, this system could not be recommended when bran and pollard are available.

Substitutes for Bran and Pollard

In view of the shortage of bran and pollard in recent years certain substitutes have been tested. The results have shown that crushed grain can be substituted for bran and pollard, and can be used to replace them wholly or in part when prices permit, or when bran and pollard are unprocurable. Many farmers who grow their own grain and have a crusher on the farm would find it more economical to use crushed grain than pollard, especially as the difference between the cost of purchased food landed on the farm and the price received on the farm for grain would be saved.

Whole Grains and Meatmeal

A ration consisting of a mixture of whole grains with meatmeal always available to the birds—no mash or crushed grain—has also

given satisfactory production. The grain may consist of a mixture of wheat, oats, maize, and barley, or as many of these grains as are available. Whole grain has not to be crushed or treated in any way, and in this respect is much cheaper than other foods. Another advantage is that it cannot be adulterated without detection and its quality may be visibly determined.

Conclusion

In reviewing the tests since their inception, the most striking feature is that, with the many different methods that have been tried and rations that vary considerably in composition and analysis, the egg production has been consistently good. Many contradictions have been noticed, but that is to be expected in experimental work.

Although satisfactory production has been obtained from many different rations, it is not advisable to continually change the ration. Slight changes may be made from time to time as the price of the different food varies, but any change should be made gradually.

Quality, quantity, and variety are three essentials in feeding poultry for egg production. The old idea that if poultry were given plenty of food they would become fat and lazy and fail to lay has been disproved; in fact, if the birds are bred on production lines, the more food they eat the more eggs they are likely to produce.

It has also been found that variety can be more economically provided in the grain than in the mash, therefore if several of the different grains—wheat, oats, maize, barley—are used, the mash may be very plain, consisting chiefly of bran, pollard, and meatmeal or dried buttermilk, and this is the ration that is recommended by the Department.

The table sets out the monthly and yearly average production of both Australorps and White Leghorns over a period of 22 years, and also for seven years:—

	Australorps and White Leghorns.	Australorps.	White Leghorns.
	Monthly Average Production for 22 Years.	Monthly Average Production for 7 Years.	Monthly Average Production for 7 Years.
	eggs per bird.	eggs per bird.	eggs per bird.
April ..	12·5	14·1	13·9
May ..	12·6	14·7	14·0
June ..	11·9	14·2	12·8
July ..	12·7	14·6	13·1
August ..	16·3	16·9	15·6
September	19·1	19·4	18·7
October	19·7	19·5	19·7
November	17·8	17·3	18·5
December	16·1	15·8	17·2
January	15·1	14·8	15·8
February	12·4	12·4	12·6
March ..	10·9	11·7	10·7
Yearly Average	177·1	185·4	182·6

WEED CONTROL IN CARROT CROPS—*continued from page 496.*

is still new. Improvements will certainly result from experiments and observations on earlier spraying, strength and method of application of the spray, persistence of the taint, and other factors. For the present, weed control in carrot crops need present no difficulties or dangers if the above directions are heeded.

Recommendations

1. Control the weeds in your carrot crop by cultivating as much as possible. Destroy the remaining weeds by spraying with the special "Kerosene Weedicide".
2. Use the weedicide neat.
3. Spray when the carrots are in the 1 to 4 "fern-leaf" stage. Avoid later spraying.
4. Don't spray the same crop twice.
5. Don't spray in very hot weather.
6. Use a fine, misty spray.
7. Be economical with the weedicide.

Live Stock Notes

Compiled by
A. C. T. HEWITT, M.Agr.Sc.,
Live Stock Science Officer

Dairy Cows

THE dairy cow will give a higher yield if she receives regular and careful attention. Some persons have a way with cows, and are able to obtain more milk from them than other attendants do. At the State Research Farm, Werribee, a few years ago, a new milker obtained an average of 62 lb. more butterfat from the 15 cows which he milked regularly than the same cows produced in their previous lactations, whereas during the same period the herd average was unchanged. This milker treated the cows kindly, and was able to draw the milk as freely as the cows "let it down."

Although udder troubles were present in the herd, none of the cows milked by this employee developed lesions. Most of the trouble developed in cows milked by poor milkers who had to be replaced. It was found that, over a period of 12 years, approximately half the number of men who were employed as milkers were not good milkers, and exercised a detrimental effect on production and the condition of the the udders. Although milkers and other dairy-farm employees have been among the lowest-paid workers in Victoria, a good milker is a skilled worker who has to be patient with the herd and constant on the job. Milking machines have mechanized dairying to some extent, but the person who is a good hand-milker and can work in the shed without creating excitement amongst the cows still obtains much more milk than a person who does not like cows, and works in the shed only because of necessity. Now that award wages have to be paid, it is more desirable to obtain employees who understand cows and whom cows understand also.

A cow produces milk during the whole 24 hours, and most production is obtained when, on twice-a-day milking, the cows are milked at 12 hour intervals, but such regular milking intervals are not always attainable on account of labour problems, even though the owner is also a labour unit. The value of milking the cows at regular intervals can be judged by any farmer whose cows are being tested, as he is then able to study the daily performances of the herd. At Werribee, 60 per cent. of the milk was produced at the morning milking, commencing at 5.30 a.m., and 40 per cent. at the evening milking, commencing at 3 p.m. but the amount of butterfat produced at each milking was approximately the same. In actual fact in the spring when the herd was averaging 30 lb. of milk daily, the average was 18 lb. of milk, testing 3.8 per

cent. butterfat in the morning, and 12 lb. averaging 4.7 per cent. test in the evening. Where whole milk is being supplied for retailing, there is a risk of supplying morning milk under the standard with such irregular intervals between milkings, especially as there is some variation in the herd from day to day, and a difficulty of thoroughly mixing all milk. With high producing cows, a great strain is placed on the udder if intervals between milking are irregular. Certain Friesian cows were milked thrice-a-day, at 5 a.m., 11 a.m., and 4.30 p.m. A typical example of the production of one of these cows was 50 lb. of milk with a 2.2 per cent. test at 5 a.m., 20 lb. of milk with a 4.5 per cent. test at 11 a.m., and 18 lb. with a 4.7 per cent. test at 4.30 p.m. The variations in milk yield and test were large, but if such cows could have been milked at eight-hour intervals, the milk yields and test would have varied little from milking to milking, and a considerable increase in total production could have been expected. Similar results could be expected with high-producing cows being milked twice-a-day, at twelve-hour intervals.

Horses

The shortage of fodder and the drought are so acute that working horses are being disposed of in greater numbers than they can be replaced by mechanized traction and transport.

There will not be sufficient tractors available within the next few months for sowing normal areas of cereal crops in the north unless a large proportion of the horses are returned.

By feeding wheat, many horses, particularly delivery horses, are being kept in work. This method of feeding will have to be followed for some considerable time, as motor vehicles are not available to replace horse-drawn ones. Unfortunately may horses are being destroyed. Others are being sold to southern farmers who welcome the opportunity of replacing their old horses cheaply.

Since 1914 the horse population of Victoria has been declining by about 10,000 head each year and as this drop will be accelerated this year, some improvement in the demand for horses may be expected until such time as the import of sufficient tractors and motor vehicles can be arranged.

The decline in the horse population is shown in table at top of next column.

Few mares are being mated this season and the foal drop for subsequent replacements will probably be the lowest on record.

Year.	Number of Horses in Victoria.
1901	392,237
1911	472,080
1914	562,331
1916	493,779
1921	487,503
1926	463,051
1931	379,872
1936	356,106
1941	318,441
1944	277,662

Select Breeding Pigs at Bacon Weight

Some pig breeders have advocated that championships at pig shows should be awarded only to stud pigs of an age and weight at which they would be fit for slaughter as baconers or porkers. The argument put forward by these breeders is that pigs are bred primarily for bacon and pork production, and therefore, adjudicating for highest awards on stud pigs should take place when they are at baconer and porker size themselves, and not when they are mature breeding animals.

There have been some practical obstacles to meeting the specific demands of these breeders, but they are certainly thinking along sound lines because live pigs must be judged on their apparent worth either as meat animals or as sires and dams of meat animals.

The wishes of those advocating the change could be satisfied if the pig shows provided classes for stud boars and sows of baconer and porker weights only, these animals to be judged for their conformity with good bacon and pork type, and for other utility features considered to be indicative of good constitution and potential productive capacity.

Whatever might be done at future pig shows, the principle involved has a practical application for every pig breeder. Whenever practicable, selections of future breeding pigs should be made when they are the size at which it is proposed to slaughter their progeny. If this were done there would be more chance of getting progeny the required type than if, for example, selection is made of a pig, which at three months old is most plump, and to some people most attractive, but which will be too short and fat when it reaches bacon weight.

It is wise to select baconer breeding stock at baconer weights, but allowances for effects of nutrition on the development of inherited charcteristics should be made.

[L. A. Downey, H.D.A., Pig Expert.]

Poultry

Pullets produced during the normal breeding season, July, August and September, give the best results, but good results are dependent, also, on other factors. Healthy, properly nourished, and well-matured parent stock is the basis for producing healthy and profitable laying birds.

Experience has taught breeders that, to obtain uniform superiority amongst the birds, they must carry on the selection of breeding stock for generations. If birds with desirable qualities are selected, it should not be expected that all their progeny will have these desirable qualities, but a much higher average will be obtained than when selection has not been practised. The cost of replacing laying birds is high, and every bird culled through faulty selection of the breeding stock is a serious loss to the poultry farmer.

The time and trouble taken in the selection of the best breeding stock would, naturally be wasted if the operations of rearing are not properly carried out. Pullets must be properly reared so that they will be well developed and constitutionally strong on reaching maturity.

The best results are obtained by rearing the pullets on open range conditions until they are well grown, and then shortly before egg production commences, removing them to their laying quarters.

The usual practice in the feeding of growing and laying birds is to give them all the food they can eat. A good variety of food, with a plentiful supply of tender greenstuff, shell grit, and clean drinking water is necessary to maintain good health and high egg production.

The pullets should be provided with clean, dry, and well ventilated laying quarters, free from draughts. The perches and surrounding woodwork should be kept free of parasites. The provision of a concrete floor enables the litter to be properly cleaned out. This should be done regularly at intervals of approximately three months. Clean straw should then be added. This will prevent the accumulation of disease producing organisms and the eggs of external and internal parasites.

Little culling will be necessary during the first year of egg production. It is usually the obviously unfit birds which require to be eliminated from the flock.

[H. F. Clinton, Poultry Expert.]

Bees

In a great number of places, especially where the autumn honey flow was of poor quality, or non-existent, colonies have emerged from the winter in a very backward condition.

In building a colony to production level, it should be borne in mind that there is a period of almost six weeks between the commencement of egg-laying and the time that the first young bees join the ranks of the field force.

In colony building, pollen is essential with the new honey coming in, but if the latter is not at hand, honey or sugar syrup may be fed, If any strong colonies are available they may be utilized to build up the weak ones.

The first manipulation is to get the required bees into the weaker colonies. This can be done on a fine, sunny day by lifting frames with bees adhering from the strong colonies, making sure the queen from the strong colony is not removed, and shaking the bees off in front of the weak colonies. Many of the young bees will crawl in and join the weak colony. When the operation is carried out a few times, combs of sealed brood can be added to the weak colony, without the danger of loss by chilling. It is inadvisable to move sealed brood from strong colonies to weak ones, without first making sure that sufficient bees are at hand in the weak colony to care for the added brood.

Weak colonies can also be built up over strong colonies by the following procedure. Take an inner cover or half-inch flat board, and cut a two-inch hole in the centre. Over the hole, tack two pieces of queen-excluding zinc, one piece on each side, to keep the queens from contacting and fighting.

Place this prepared inner cover over a strong colony, and above the inner cover, place the weak colony. If the weak colony is without brood, supply same before placing it over the strong hive. A small entrance can be given the weak colony at the back and from above, by cutting through the hand hole or moving the cover a little to allow a bee passage. Bees from the strong colony below will pass through the queen-excluder, and help in building up the weak one, which can be lifted off and placed at the rear when it has sufficient bees and brood. This will take approximately one month. It is essential that the operation be done as quietly and with as little disturbance as possible, as the weak colony, if unduly disturbed may rush down, joining the strong colony, and be killed immediately. Dusk is the best time to carry out this work, and unless there is a good flow of honey at the time considerable care and experience are required.

[W. A. Collins, Apiary Inspector.]

War Agricultural Committee Notes

Compiled by the Central Executive

THE seventh conference of District Chairmen of the Victorian War Agricultural Committees was held on October 11th and 12th.

In addressing the Conference the Director of Agriculture, Mr. H. A. Mullett, said that prospects for the coming summer and autumn were bad and that with the certainty of poor cereal hay crops this year, a serious shortage of fodder was inevitable. Stocks of hay held in the State were very low and the Department had arranged to import fodder from New South Wales and Tasmania to alleviate the position. The West Australian Department of Agriculture had also been approached with a view to this State obtaining stocks from the new season's crop as soon as it was available. Although considerable quantities would be imported, there would still be insufficient fodder available to meet all requirements.

To relieve the position as far as possible Mr. Mullett stressed the need for conservation of all available supplies of cereal and grass hay. He recalled that the first major problem to face the Committee in 1942 was the need to conserve the plentiful grass hay crop of that year. The fodder conserved then had been of great value since. This season the crop was much lighter, and he appealed to the War Agricultural Committees to assist the Department of Agriculture again in launching a campaign to conserve all the fodder that could be harvested in the respective districts.

Production Goals

Despite the dry conditions in the North-eastern district dairy production for the first two months of this year over the whole State was actually about 3 per cent. above last year's production. Food Control authorities regard dairying as the No. 1 priority and maximum production of dairy produce is desired.

Victoria has been asked this year to increase her potato acreage to a total of 94,000 acres, compared with a normal pre-war production of 40,000 acres, and farmers have responded so well that up to the present, some 89,000 acres has been contracted for.

The flax production goal of 42,000 acres representing an increase of 10,000 acres on the previous year, has been almost attained.

Victoria's production of cereals will be very low owing to the drought and plans will have to be made to ensure supplies of seed wheat, oats and barley for next season's sowing.

Materials Supply

In recent months materials most required by farmers have become scarcer. Galvanized iron, cement sheeting, bore casing and fencing materials are exceedingly short and electric motors, pumps and water piping, although more plentiful than the former group are nevertheless short of demand.

At present the supply of baling wire is equal to the demand, and it is expected that all applications for wire to bale this season's grass hay harvest will be met.

Agricultural Machinery

The supply of small engines for priority production has improved somewhat and the most urgent orders have been supplied. Many orders, however, are still on hand. The supply of shearing machines, particularly of small plants, is still very limited although the position is now somewhat easier.

There is a shortage of windmills, which is most serious under the present circumstances, and endeavours have been made to increase supplies. Approved applications on hand are sufficient to absorb the total Victorian production to the end of 1944.

Although the number of tractors allocated to Victoria has increased this year compared with the number available in 1943, there are still some 800 approved applications awaiting supply. The shortage is most serious in the larger types of tractor. Every endeavour will be made in the coming months to supply tractors to those farmers in the northern Wimmera and Mallee areas to replace horse teams lost because of the drought.

A number of applications has been received for the establishment of machinery pools, indicating that farmers are appreciating

the value of this service. The establishment of these pools under the hire purchase arrangements are favoured by most applicants.

Manpower

In a discussion with the Manpower Directorate it was intimated that the granting of seasonal leave to servicemen to assist in primary production may possibly be discontinued except in very urgent cases, because of the release of a further 30,000 men for food production by June next. The Army authorities, therefore, considered that they were unable to further weaken establishments by allowing seasonal leave. However, this loss will be offset to some extent by the number of men already released from the Services and from civilian industry.

To meet the demand for harvest labour it will be essential that the most economical use be made of existing labour on the farms.

There is an urgent need for the return of special key men to staff hay presses, agricultural repair shops and butter factories. Great difficulty is also being experienced in the agricultural machinery workshops and fertilizer works, cool stores and slaughtering establishments owing to manpower shortages.

Tubercle-free Herds

ACCREDITED TUBERCLE-FREE HERDS.

The following herds have been declared free of tuberculosis under the *Accredited Tubercle-free Herd Scheme* conducted by the Department of Agriculture. Under this scheme a tubercle-free accredited herd of cattle is one in which the entire herd has passed two negative, successive, annual physical examinations and tuberculin tests, or upon disclosure of infection, three semi-annual, successive physical examinations and tuberculin tests applied by a State Veterinarian or by a qualified and registered veterinarian who is approved by the Chief Veterinary Inspector for that purpose.

Name.	Address.	Number in Herd.	Name.	Address.	Number in Herd.
Aboriginal Station ..	Lake Tyers	109	Longerenong Agricultural College	Dooen	48
Armstrong and Son ..	Wangaratta	105	Maloney, P. J.	Tongala	66
Ballarat Orphanage ..	Ballarat	105	McNabb and Son, G. A. ..	Irrewillipe East ..	154
Banyule Stud Pty. Ltd. ..	Wangaratta	54	Nancarrow Bros. ..	Kerang	47
Black, I. S., Estate ..	Mount Noorat	53	Noonan, G.	Benalla	31
Cribbes, T.	Wangaratta	39	Noonan, Mrs. S. A. ..	Benalla	35
Deering, J. T.	South Wangaratta ..	61	Northcote Children's Farm	Bacchus Marsh ..	166
Dennis, Mrs. A. A. ..	Frankston	23	Onley, W. H.	"Glenholme," Caldermeade	71
Dookie Agricultural College	Dookie	85	Parker, Mrs. L. M. ..	Tallarook	56
Geelong Grammar School	Corio	78	Payne, A. E. T. ..	"Yarra View," Lilydale	66
Gibson, Mrs. C. S. ..	"Sweeney's," Eltham ..	35	Payne, T. E. N. ..	"Woodburn," Kilmore ..	44
Gorman, A. W.	"Cathcart," Alexandra ..	57	Poole, M. A. and D. ..	Caldermeade	155
Griffin, G. W.	Gladysdale	57	Poole, M. A. and D. ..	Yannathan	79
Griffiths, J. G.	Benalla	132	Powell, T. S.	"Carellen," Mansfield ..	43
Henry, J. A.	Warrnambool	41	Richardson, Bros., Messrs.	"Faldinghurst," Upper Beaconsfield	30
Howlett, Mrs. G. and Miss E. Samuel	Lang Lang	55	School of Horticulture ..	Burnley	6
Jahobi, L. W.	"Granada," Yannathan	80	State Experiment Farm ..	Rutherglen	37
Kano, F. E.	Warrnambool	28	State Research Farm ..	Werribee	245
Kilmany Park Farm Home for Boys	Sale	105	Stephens, Dr. F. ..	Vermont	32
Lady Talbot Milk Supply Co.	Cranbourne	484	Vagg, T. R.	Officedale	45
Lawrence, P. H. ..	"Rainga," Tarrawarra ..	83	Wells, W. G.	Caldermeade	65
			Woodyer, P. A. ..	Mornington	19

In addition to the above-mentioned herds there are 786 commercial dairy herds containing 19,486 head of cattle which may be considered free of tuberculosis. All these herds have given negative reactions to two or more successive tests conducted by departmental veterinary officers, but inasmuch as replacement cows are only submitted to one test before being admitted to the herds, they cannot be considered as accredited under the accreditation scheme which requires, among other things, that no cow shall be admitted to the herds unless it has given two (2) negative reactions at an interval of 60 days, and must be kept in isolation during the period between the two tests.

There are also 452 herds in which 12,413 head of cattle have passed one test, and may be considered therefore, to be in process of becoming tubercle-free herds.

Identification System for Association Tested Cows

By W. J. YUILL, Supervisor of Herd Testing

EARLY in the development of the herd-testing movement in Victoria, the need for a sound system of identification of all tested cows became apparent. Where the cows were in small herds and directly under the control of the owner, names served the useful purpose of individualizing the animals, but, where large herds were under test, naming or numbering was useless, unless associated with a brand or permanent mark.

Much attention was given to this question, and, finally, a system suggested by an officer of the Department of Agriculture was adopted. A symbol or letter was allotted to each association unit, together with a number for each herd and each cow. The system has also been used since 1929 for the identification of selected calves which have been registered in the Calf Marking Scheme.

In countries where the herds are small, and the cows housed or tethered for the greater part of their life, the question of identification presents no problem. In New Zealand and Australia, however, where the herds are large and the cows are under control in the sheds only during the actual milking operations, much confusion may occur in the absence of an individualizing brand.

The most important of all reasons for a sound system of identifying herd-test cows is to place the identity of the animal beyond doubt, so that the yields may be credited to the right cow. A further reason is to obviate the difficulty of identification which at times arises, where a change of ownership or management takes place. Names can be applied to any cow, but it is the brand, together with the name, that establishes identity.

During the first phase of herd-recording work, the yield records were used mainly for culling purposes, and for the selection of breeding animals. In what may be termed the second phase, a much greater need for a sound system of identification of all herd-tested cows has become evident, for world-wide attention is now being focused on the importance of sire control—or bull-proving as the work is sometimes called.

If this work is to be received with the confidence it deserves, it is essential that the age and identity of the young cows, and their dams, shall be known with certainty. The basis of the work is a comparison of the age-corrected yields of the males and daughters of the sire.

Plan of Identification

Any system of identification that includes the desirable features of the old method of marking test-cows, and at the same time makes provision for the correct determination of the age, and identity of the tested cow and her dam, must commend itself to all breeders and farmers who practise herd-testing.

Consideration by a sub-committee of the Central Council of Herd-testing was given to the value of many identification systems, such as tail-tags, ear-tags, horn or hoof branding, and the tattooing of the back of the udder. Attention was also given to the objections raised in some quarters to the need for an individualizing brand, as it was thought that the great importance of a sound system of identification had not been fully appreciated. It was agreed, however, that there were a few sincere objections to fire branding cows, which were, in some instances, the pets of the farmer and his family.

Acid branding was also investigated, and found to be satisfactory in the hands of a capable operator. The Danish system of horn branding was obviously useless in a State where dehorning is so widely practised. The hot iron was found to be most commonly used, particularly where a simple brand was needed, but there appeared to be sound claims for the acid brand where a composite brand, as used on herd-test cows, was being applied.

After exhaustive consideration had been given to the merits of each known system of marking and branding, it was decided that the most desirable form of permanent identification for herd-tested cattle was that of the ear tattoo. This method is the main one used by breed societies of all kinds, the usual practice being to place it in the ear of the animal within a specified time of birth—usually 60 days.

The owner's initials or a symbol are usually registered as an owner's mark, together with an individual number for each animal. In the case of calves, these are entered in the calf register, and become the basis of the future identification of the animal concerned.

In the New Zealand Group Herd Test, 10,000 registered cows are accepted on the basis of their tattoo—as are upwards of 3,000 pure-bred registered cows under Association Test in Victoria. To this number can now be added all cows tattooed under the Marked Calf Scheme, for although there may be more than one daughter carrying its dam's firebrand as an ear tattoo, each animal is readily identifiable by the letter representing the year of birth, as for instance, A.6.8.M. (A, represents the particular association, 6, the number of the herd, 8, the dam's number, and M, the year of the birth of the animal.)

By combining the best features of the old system of branding herd-test cows and the Marked Calf Scheme, a sound method of identification has been evolved.

The plan provides for the tattooing of any cows that have not so far been branded by fire or acid. It also allows the testing farmer the right to place part of the identification in the cow's ear, as a tattoo, and the remainder on the right neck or thigh as a fire or acid brand, or, as is strongly recommended, the tattooing of the future test cows as calves. This is explained later in the article.

When the system of tattooing all Association Test calves is operating throughout the State, greater importance will apply to the district herd-test work, for it will provide the necessary background for extensive sire survey, as practised in northern Europe, Scandinavia, America, and New Zealand.

Basis of Plan.

The system operates along lines similar to those on which pure-breed societies work. In New Zealand, much attention has been given to the perfecting of the Marked Calf Scheme, and, in particular, to the method of identifying such calves.

In New Zealand, each marked calf is tattooed in one ear with its own number and a letter denoting the year of birth, while in the other ear, appears the letter denoting the association and the registered symbol of the Calf Marking Scheme.

All Heifer Calves to be Tattooed.

The Victorian Central Council of Herd-testing proposes to have all calves intended for the herd tattooed during the first year of their life—preferably within a few weeks of birth. When this is done there will be no further need for any other herd-test brand in any association test in Victoria.

The tattoo system which has been used only for "marked calves" will now be practised by the whole herd-test movement. *There still remains one essential difference, however,* namely, that only such calves as are fully qualified under the *rules of the Marked-Calf Scheme* shall carry the letter "H" in a diamond, which is the registered mark of the scheme. By the use of this system it will be seen that the "calf scheme" has suffered no loss, while the herd-test movement has gained an identification scheme of far-reaching importance.

A system of identification of selected calves has been in operation in Victoria since 1929.

Briefly, the plan provides for the tattooing of *all calves,* with the only identification needed throughout life—as in the case of a registered pure-bred animal. No further branding will be required when the calf subsequently enters the milking herd, and all the tester will need to do, to establish the identity of the individual, will be to check the tattoo in the ears.

In addition to its value for herd-testing purposes, the plan has advantages in other respects. It will prove invaluable for stock-owners, who place their dry cows and growing heifers on agistment for extended periods, for under the scheme no two animals in Victoria will be tattooed with the same marks, and these will be registered in the association records.

The plan establishes a definite relationship between dams and daughters, and provides information concerning the year of birth. In short, it can be expected that in a few years the scheme will provide much of the confidence now associated with a registered pedigree by making available reliable information of the parents, their production yields, and the age of the animals concerned.

The Cattle Breeding Act, which comes into operation in 1945, demands bulls ex dams with prescribed minimum yields of butter-fat, and the new scheme will be of additional value in providing the necessary identification of the dam.

The wider application of the individualizing identification scheme has been in operation since January, 1941, and, as with the present Marked Calf Scheme, the official year commences on the first day of January of each year. As the first calves to be tattooed under the latter scheme were over ten years of age it was decided to revert to the letter "A" for the year 1941 and begin the alphabet over again. Each succeeding year a new letter is used. This is issued by the Secretary of the Victorian United Cow Testing Association, Commerce House, Flinders-street, Melbourne.

In this way there will be little or no cost associated with the implementation of the scheme, for the majority of units possess a tattoo outfit, a set of numerals, and many letters of the alphabet. The most satisfactory material for tattooing has been found to be "Zebra" stove polish. Lamp-black and vaseline also are effective, cheap, and easily obtainable.

It is the practice on some farms to use the "caustic stick" to destroy the "horn buds" and to tattoo the calves at the same time. This usually is done about the fifth to the seventh day after birth, while the calves are still on the tether. In this way, ear sucking which may spoil the tattoo, is largely prevented. It is advisable to keep the animals separted for about a week, after which the tattoo is unlikely to be spoiled, as the punctures heal over in less than that time. If the advice given to testers is faithfully carried out, the tattoo will be permanent throughout the life of the animal.

The individualizing brand of the herd test movement which has been in operation since 1926 is shown in Fig. 1. The example in this

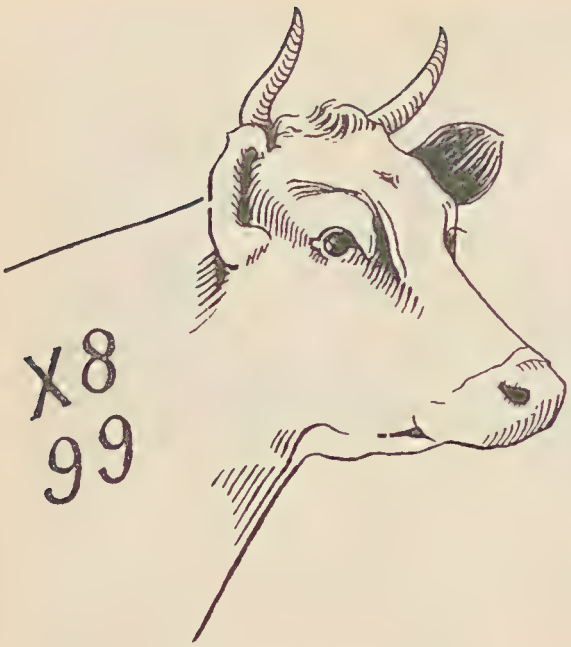


Fig. 1—The system of fire or acid branding herd test cows as adopted by the Victorian United Cow Test Association.

case is No. 99 cow in No. 8 herd of the "X" Association. The same identification can be secured by the ear tattoo as shown in Fig. 2.

In each case the animal can be traced to the herd and area where it was under test, thus making it possible to obtain all production records from the association files or the Department of Agriculture.

Each calf registered in the Marked Calf Scheme carries in its ear as a tattoo its dam's fire brand, also a letter to denote the year of birth. The "H" in a diamond, which is the symbol of the scheme, is also tattooed in the left ear. A qualified calf from the cow branded similarly to Fig. 2 would be marked as shown in Fig. 3. The full firebrand of the dam is shown in the right ear, and connects the dam and daughter. The letter "P" was tattooed into all calves born in 1940, while the "H" in a diamond shows that the sire was a registered pure-bred whose dam was a known producer.

By combining the best feature of the Victorian United Cow Testing Association tested cow brand with that of the Marked Calf Scheme, the system for identifying all calves has been made possible. Under this system each calf will be tattooed with *its own number* in the right ear, whereas in the Marked Calf Scheme the dam's number was used. Now the dam's number will be placed in the left ear, together with the letter denoting the year of birth. *All heifer calves* will be tattooed under the plan with the letter of the year and the details as shown in Fig. 4.

The example given is calf 109 in number 8 herd of the "X" Association, born in year "D" (i.e., 1944), and its dam is No. 99. All that is required to make this calf a fully tattooed one under the Marked Calf Scheme is to add the "H" in the diamond to the left ear. The interests of the scheme, therefore, are well safeguarded, as only qualified calves may receive this registered symbol.

It may be thought by some that the ears of a calf are too small to receive so many tattoo items, but the fact that up to six letters and/or figures are commonly tattooed in calves' ears, is sufficient answer to any misgivings on this point. There are, also, numbers of certificated Standard Herd Test cows in this State carrying the crown and up to four figures in one ear, in addition to the calf tattoo identification of the breed society. In New Zealand up to eight letters and/or numerals are tattooed into one ear of cows which have been certificated under the group herd test conditions.

Tattooing Simpler than Branding

In fire branding, with the iron heated to cherry red, a practical brander can secure 100 per cent. satisfactory results, but operators, lacking experience, often use the brand too hot or too cold, thereby obtaining indifferent results. When acids are used the inexperienced brander frequently uses too much material, causing some of it to run, giving a blotch brand. Tattooing is simpler than branding, either by fire or acid, but there are some features of this method which require attention if the best results are to be obtained.

Fig. 2—A similar system of identification to that shown in fig. 1, and now accepted as an ear tattoo.

Inspection of a cow's ear will show that there are two main ridges of cartilage running lengthwise for about half of its length with ample room to tattoo a row of figures between these ridges, as well as above or below them. Usually the top section is preferred, although the area between the ridges is favoured by some operators. Care should be taken not to tattoo across the ridges, or a mutilated ear may result. The haired-over area, near the edge of the ear, should be avoided also.

Fig. 3—Showing the system of identification used in marked calf scheme.

The tattoo outfits now in use contain three items in each of two rows, and the outside measurement of the "bite" will be found not to exceed $1\frac{3}{8}$ inches for the large size, and $1\frac{1}{8}$ inches for the smaller set. The latter set is recommended for calves, since the tattoo will grow to at least twice the size by the time the cow reaches maturity.

Before proceeding to tattoo, the ear should be wiped out with a kerosene or benzine cloth in order to remove grease, dirt, or wax. An essential precaution at this stage is to "try the bite" on a piece of paper or cardboard before it is placed in the ear. Some operators make the imprint of the needles on the palm of their hand. After having placed all the items correctly in the holder there is still a possibility of making a serious error, namely of working from the top of the ear with letters that were prepared for the bottom position.

Some operators prefer to work from the bottom of the ear. When this is being done the items in the holder should be set up to read from right to left. It will then read correctly when tattooed into the ear. If after having so prepared the tattoo the "bite" is taken from the top of the ear, *a reversed and inverted tattoo will result.* Should this be done, the tattoo must be reported as such.

If the tattoo is prepared for work from the top of the ear, the letters or figures should be placed in the holder in an inverted position and read from left to right. When placed in the ear in this manner the items will appear in the ear correct for normal reading. The needles must be forced right through the ear, and the punctures filled with paste by rubbing it over the tattooed area. Some operators obtain equally good results by rubbing the paste in only on the inside of the ear, but usually it is rubbed over the area before the "bite" is made, and well rubbed in from both sides of the ear after tattooing is completed.

Officers of the Department rarely find indistinct tattooing, but they have found figures or letters, and at times, the whole tattoo reversed. Such errors should not occur if the precautions suggested are kept in mind.

Fewer mistakes will be made by a person constantly engaged in tattooing work than one not used to it, and for this reason some associations pay their herd-tester a fee (usually 3d. a head) to tattoo all calves. Under the Marked Calf Scheme no person other than a herd-tester is authorized by the Central Council to have the custody of the "H" in the diamond, or to place it in the ear of a qualified calf.

The Central Council desires each association's executive to control the *tattooing of all cows* in their own way, but recommends that the work be done by the herd-tester, the payment for the service to be a domestic arrangement between the executive and the tester. Some breeders who possess a tattoo outfit may desire to do their own work. Herd test members will now have their tattooing done each month,

Fig. 4—The plan for marking all unregistered heifer calves in the herds of association tested cows.

as the calves arrive, or as early in the life of the calf as possible for the subsidy conditions now demand that this work shall be done by the herd tester.

The important features of this plan to keep in mind are that it fulfills the condition of the subsidy paid by the Government for

[*Continued on page* 512.

TUBERCULOSIS IN STOCK

By W. M. LEREW, G.M.V.C., Veterinary Officer

TUBERCULOSIS, or consumption as it is generally termed when it affects the lungs of man, is a common disease among some of the lower animals, especially cattle and pigs. It is the most widely-spread stock disease known, and under conditions favouring it, may affect every animal in a herd. It is communicable from cattle to man. In such cases infection usually takes place by the use of milk of diseased cows. Pigs also are liable to the disease, if fed on the raw milk or on the carcasses of tubercular animals. Birds may also contract the disease, though mammalian tuberculosis is not transmissible to birds.

The bacillus tuberculosis, the causal organism of the disease, is of great vitality, and if conditions are favourable will retain its virulence for months, but if exposed to direct sunlight it dies in a few hours. In a moist heat of 140° F. it will succumb in an hour and at 180° F. it will be killed in fifteen minutes.

Contributory Causes

Although, of course, the tubercle bacillus must be present in order that the disease may exist, several outside influences contribute largely to the spread and virulence of an outbreak. Amongst them may be mentioned insanitary surroundings, overcrowding, insufficient nourishment, heavy milking, in-breeding, and breeding from stock that are too young. These conditions all tend to decrease bodily health, and to lower an animal's resistance. The state under which the germ flourishes is provided in dark, damp, badly ventilated sheds.

Tuberculosis is prevalent in herds running on rich heavy flats, where the ground has a high moisture content. It is, however, comparatively rare in hill country, and in the drier northern portions of the State. Congenital tuberculosis is almost unknown. It is not until the germ is implanted, and conditions favour its development, that the disease begins.

In stock, progress is slow and insidious. The disease may be present for a long period before its presence is even suspected, and it may actually spread through the whole herd unless proper precautions are taken to check it. Practically any organ of the body may become affected, but a greater proportion of cases occurs in the intestinal glands, or in the lungs and the glands in the chest. Other common seats of the disease are the glands round the throat, those in front of the shoulder and stifle, and the glands above the back of the udder, and the udder itself.

The characteristic lesion is a small rounded nodule which unites with other nodules to form conglomerate masses of all sizes up to 12 inches in diameter. When these tubercles, as they are called, are cut into, the contents will be found to vary from a creamy pus to a dense firm mass resembling soft ripe cheese. This latter condition is termed caseation. In advanced or chronic cases the tubercle may be hard and gritty, due to deposits of lime salts. This is referred to as calcification. In the lungs—the most common seat of infection—the tubercles may often occur in clusters, and the covering of the lungs and the lining of the chest walls become coated with fringes of false membranes containing tubercles which increase to form pale red cauliflower-like growths. These are often spoken of as "grapes."

If the infection is in the lungs (pulmonary tuberculosis), the first sign of illness will be a cough which will be greatly aggravated by any exertion. Wasting then commences, the skin becomes harsh and dry, and the old hair is not shed as soon as it should be. Gradually the animal grows thinner and weaker till death occurs.

If the abdominal organs are affected, loss of condition may be the first thing noticed, but sometimes chronic scouring is very marked. When the superficial glands are attacked, they become considerably enlarged and hardened, and are rough to the touch. This roughness is due to the tubercles actually projecting from the surface of the gland; they are painless, and rarely burst and discharge. Snoring is sometimes very pronounced when certain of the deeper throat glands are affected.

The first indication of tuberculosis in a well-fed herd will probably be that one beast will begin to lose condition, and as time goes on the decline will become more marked. This is only a general guide, for occasionally when fat beasts are killed it is found that they have been suffering from what is called generalized tuberculosis, and the whole carcass has to be condemned.

Although advanced cases may be readily discovered, the only certain means of detecting the disease in its early stages is by the tuberculin test, which is everywhere recognized as the most reliable and efficient test known for ascertaining the presence of tuberculosis in cattle. This test may be carried out by any qualified veterinary surgeon, and while by its use affected animals, even in the early stages, may be discovered, it does not upset or harm in any way the healthy beasts which are tested.

The disease exists in every civilized country in the world, and the denser the population the greater the percentage of cases. Therefore the best means of retarding its spread is to prevent overcrowding, and to ensure exposure to a plentiful supply of fresh air and sunshine. Tuberculosis is spread amongst cattle by rearing calves on milk from the tubercular cows, or by allowing sound and diseased animals to feed out of the same receptacles, or even by permitting a tubercular beast to stay in the herd.

Where the tubercle bacillus is present, tuberculosis will spread very rapidly amongst pigs when they are confined in damp, badly-ventilated sties, or if they are fed on milk or offal from tubercular cows. It is always advisable that any meat fed to pigs should be cooked thoroughly. As tuberculosis is communicable from man to animals, a tubercular person should not be employed in tending cattle or pigs.

In an individual herd, prevention may be carried out when building up the herd by introducing only animals that have been submitted to and passed the tuberculin test. The herd should be tested annually, and if a beast reacts it should be at once removed, and all feeding utensils and the shed should be disinfected. If a tubercle-free herd is maintained under proper conditions, the disease should not make its appearance, and young stock from such a herd will command higher prices than those from a non-tested herd.

All cow-sheds should be well lighted and well ventilated, and have properly drained impervious floors. It is a precaution against tuberculosis to feed cows well, especially if they are high producers. A further safeguard is to rug cows in cold weather. Calves that have always been well fed and have been reared in healthy surroundings will be less likely to become tubercular than badly fed animals confined in close ill-ventilated buildings.

Pasteurization

As milk infected with the tubercle bacillus is one of the most prolific causes of tuberculosis in man, it is strongly urged that all raw milk intended for food (except milk from certified tubercle-free cows) should be pasteurized. The method recommended is as follows:—

> The milk to be heated and retained at a temperature of not less than 145° F. and not more than 150° F. for at least half an hour, and cooled immediately afterwards to a temperature of 40° F. or less.

The House Cow

The house cow is always a possible source of danger, and it is advisable to have this class of animal tuberculin tested before starting to use its milk. As this milk is frequently used for rearing young children, it is essential that every care shall be taken to ensure its purity. A measure of milk taken from the mixed milk of a whole herd will not give the same risk of infection as milk from an individual untested cow.

Cases of Tuberculosis to be Reported

Both the Stock Diseases Act and the Dairy Supervision Act make it obligatory for owners to report immediately to the Department of Agriculture any outbreak of tuberculosis in their herds. Under the terms of the Cattle Compensation and the Swine Compensation Acts, owners are also bound to report cases occurring in cattle or pigs, and where any of these animals are destroyed by order of a veterinary officer or stock inspector of the Department of Agriculture, compensation will be paid. This payment is subject to the owner of the condemned animal producing, in the case of a purchased animal, a receipt for its purchase carrying the necessary Cattle or Swine Compensation stamps.

The Tuberculin Test

The tuberculin test in use at the present time is known as the single caudal fold test. The tuberculin is injected into one of the folds of bare skin situated under the butt of the tail, and the site of the injection is examined 96 hours later. The diagnosis is then made on any alteration that has occurred. This test involves a minimum of inconvenience to the owner, as the cattle are only kept in the bails for a few minutes. The tuberculin is injected betwen the layers of the skin, that is, intradermally and not subcutaneously, and the needle used is so fine that no pain is inflicted on the animal.

When any reactors are discovered in a herd all the remaining animals should be retested within six months, but if there are no reactors and no fresh introductions to the herd, a period of twelve months may be allowed to elapse before re-testing. When a herd is tested it is most essential that all cattle on the property should be done; that is, bulls, dry stock, and all the young stock, and not just the milking cows.

If there are any reactors it is necessary to thoroughly clean out and sterilize all feed boxes and troughs as these are a principal source of danger. Sheds should be disinfected by thorough cleaning and spraying out with a mixture of hypochlorite of soda, using three tablespoons of the standard solution, containing 12½ per cent. of available chlorine to each gallon of water.

Identification System of Association Tested Cows—*continued from page 509.*

identification of herd-tested cows. It also provides permanent identity for all purposes —as in the case of registered pure-bred stock —and it prepares the background for the new and very important work of sire surveys.

In discussing the importance of bull indexing work the chief of the Division of Dairy Herd Improvement Investigation of the Bureau of Dairy Industry (J. F. Kendrick) says, "inter alia"—"Because the use of good proved sires, and sons of such sires, is now recognized as the surest and quickest way to improve the inherent producing ability of dairy herds, the Bureau of Dairy Industry and the State extension services are co-operating in a nation-wide programme to prove all sires that are being used in association herds, and to aid in disseminating and perpetuating the influence of outstanding sires. To facilitate this programme the co-operating agencies have inaugurated a system for establishing and recording the identity of every association animal (male and female); and reporting the production record of all females for permanent recording by the Bureau of Dairy Industry. In general, the objective of the larger programme is to so improve the association herds that they may serve as a source of breeding stock for improving the whole dairy cow population." Sire-control work has greatly developed in all leading dairying countries, and it is not too much to claim that the future development of herd-test work will be mainly associated with testing sires, rather than testing cows, for the possible influence of any sire may well be fifty times greater than that of any cow.

This plan must be superimposed on herd-test work; for the basis of bull indexing, or sire surveys is the comparison of the age-corrected records of the males and daughters of a sire. The work can receive full confidence only when the age and identity of all animals are above suspicion. The new identification plan put forward by the Central Council of Herd-testing will go a long way towards supplying the necessary confidence.

Pin-Hole Borers of Fire-Killed Mountain Ash

I. Survey and Field Observations

By T. W. HOGAN, B.Agr.Sc., Assistant Entomologist, Biological Branch

IN January, 1939, fires swept through the forests of Victoria causing incalculable damage to timber resources of the State. Almost the whole of the mountain ash (*E. regnans*) and alpine ash (*E. gigantea*) forests of the Central Highlands, covering an area of approximately 200,000 acres were killed. These forests formerly supplied the greater part of the hardwood timber requirements of the State and in order to extend the period over which the fire-killed trees could be milled, a salvage scheme was drawn up and put into operation by the end of the same year.

The necessity for salvage is due to the fact that as the surface wood dries out cracks are formed which deepen until eventually milling becomes unprofitable. This physical deterioration is the chief cause of the degrade of standing fire-killed timber, and can be minimised or prevented, by felling the trees and preserving under conditions which retard, or prevent, loss of moisture.

Past experience had shown that infestation by pin-hole borers then becomes the main cause of deterioration. Therefore, when at various times after salvage operations had commenced, reports came in from forest officers concerning the infestation of fire-killed timber by pin-hole borers, the Forests Commission obtained an independent report from R. T. M. Pescott, Entomologist of the Department of Agriculture. On the recommendation of this officer and at the request of the Commission an investigation into the problem was commenced by this Department in 1942

When the original salvage scheme was being planned, the lack of fundamental information about the types, habits and importance of the borers likely to cause damage was a serious handicap; particularly when dealing with methods of salvage not previously used in Victoria. Moreover, even with salvage felling, a method which had been used before, it was not possible to predict the extent of the damage likely to occur after any given period.

The present investigation has been designed to obtain information on these points. This report concerns the types of pin-hole borer present, the damage caused by them, the extent and progress of the infestation in relation to the methods of salvage used and certain factors which appear to influence the degree of infestation.

TYPES OF PIN-HOLE BORER PRESENT

Two types of pin-hole borer have been found in fire-killed timber of which the more prevalent up to 1943 was *Platypus sub-granosus* Schedl, a type of "ambrosia" beetle. This species is endemic to Australia and has the usual characteristics of the ambrosia beetles, in that it attacks only unhealthy or damaged green trees, or dead trees which have not become

too dry. The initial boring and most of the subsequent extension of the galleries, are done by the adult beetles which construct a gallery penetrating both sapwood and heartwood before laying the eggs from which the new brood develops.

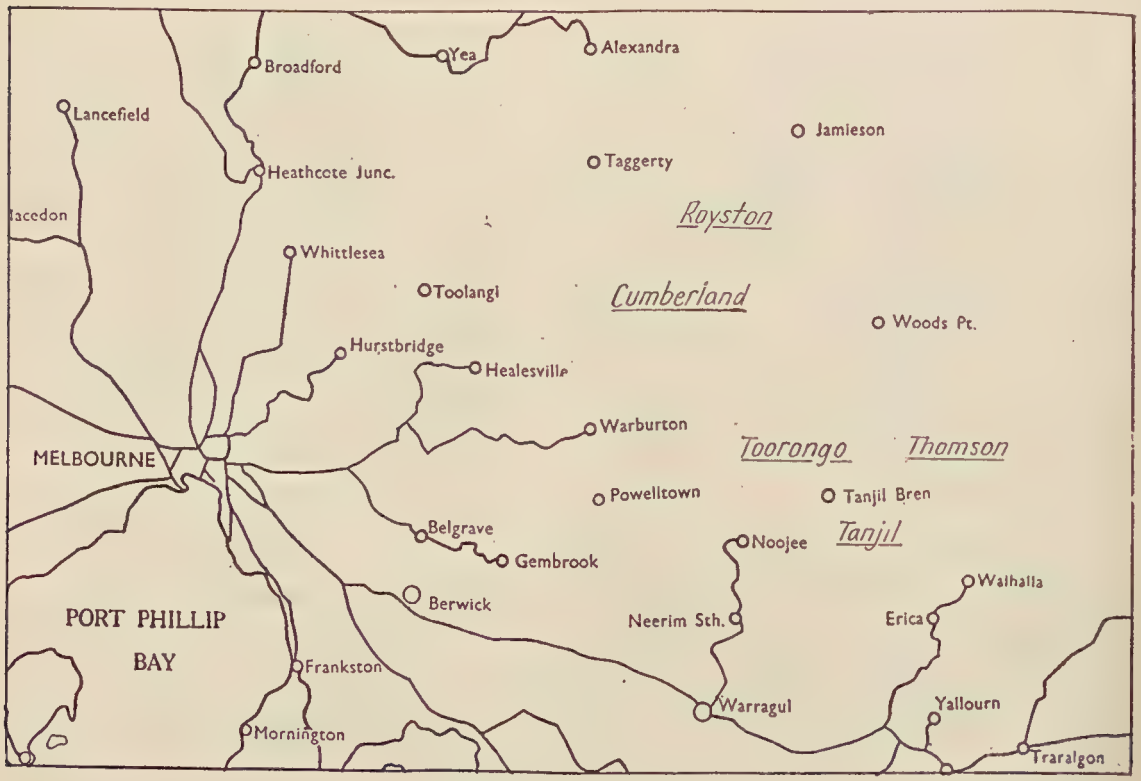
The other borer is a *Lymexylid* which had not been found in the 1939 fire-killed timber to any appreciable extent until the end of 1942, and of which, owing to its long life cycle, adult specimens have not yet been obtained. In this case, all the boring is done by the larval stage of the insect. The adult beetle apparently lays its eggs in cracks in the surface of the wood and the young larvae, gradually growing larger, bore into the wood. The gradual enlargement of the tunnel so formed, extending right into the centre of the log, the greater length of the tunnels and the fact that the entries usually occur in straight lines along the side of the log, enable damage by this borer to be easily distinguished. The wood is also stained and the damage in general is much more severe than that caused by the Platypodids.

PIN-HOLE BORER INFESTATION IN RELATION TO TYPES OF SALVAGE

Salvage-felled Logs

This method of salvage had been standard practice in Victoria long before the 1939 fires. The trees are felled and left on the forest floor, where the protection afforded by the growth of vegetation around them reduces the rate of drying out and hence the rate of physical deterioration. The ends of the logs are coated with a material consisting of a mixture of equal parts of creosote and petrolatum, in order to prevent the more rapid drying out from the ends, which would result in checking and splitting.

Platypodids. When examination of these logs was first made early in 1942, Platypodids were the only type of pin-hole borer found present and in order to provide a record of the degree of infestation occuring, and to obtain evidence as to whether district or other factors were of importance, counts were made of the actual number of entries occurring in a sample number of logs from different areas



Mountain ash salvage areas. [Forests Com. Map.

in four districts. Six logs was the minimum number examined in any one area, and in each case a traverse was taken across the area so that logs under a variety of conditions would be obtained. Side entries only were counted and a record kept of the size of the log and a description of the situation in which it lay. End entries have not been taken into account because, however numerous they may be, the depth of entry is not sufficient to make them of economic importance. The density of attack for each log has been calculated as the number of entries per foot length of a log 10 ft. in girth. The true infestation would be higher than that shown by counts, as many unoccupied entries become obscured. Royston Valley and Thomson Valley have been grouped together because they show the same level of infestation.

TABLE I.

Average Platypodid infestation of salvage felled logs.

District.	Entries/ft. Length of Standard Log.
Eastern Tanjil	0·5
Cumberland	4·9
Royston Valley .. }	2·2
Thomson Valley .. }	

Difference required for significance at 5 per cent. level = 1·6.

Difference required for significance at 1 per cent. level = 2·2.

Of the factors which might explain the difference in level of infestation between districts the most important is considered to be the density of the canopy formed by the growth of vegetation around the logs. Lowest infestation has been found in the two extremes of very dense canopy and completely exposed logs. The Eastern Tanjil area is very uniform and is characterized by the dense growth of the fast-growing Silver Wattle (*Acacia dealbata*) providing very sheltered conditions in which higher humidities and lower temperatures than in more exposed situations prevail over the summer. Under these conditions very low infestation has occurred (Table I.).

No district gives uniformly exposed conditions, but Royston Valley and Thomson Valley have a higher proportion of exposed logs, and in general, the canopy is lighter than in the other districts. Moreover, apart from the evidence of district differences, it has been noticed in those districts with light to medium canopy that the lower infestation is in the more exposed logs.

A salvage-felled log.

Cumberland, where the canopy is intermediate, apparently represents the conditions most suitable to Platypodid development. Nevertheless the infestation at Cumberland is relatively higher than can be accounted for by this factor alone and it is considered that there are two other factors which contributed in this district, viz., the less severe burning of the trees in this area; and the initial borer population as influenced by the previous history of the area. Many other logs in these areas have been examined without making actual counts on them but no evidence has been found to suggest that the sampled logs are not reasonably representative of the logs within these areas.

Observations on salvage felled logs have been continued since the original survey, but no fresh Platypodid attack of any significance has occurred. The general low level of Platypodid infestation in all areas, except Cumberland, has been confirmed at the mills where no damage of economic importance caused by this group of borer has been seen other than at Cumberland.

MAXIMUM INFESTATION.

As a measure of the damage which could be caused by these borers under the most favourable circumstances, a mill study was carried

out on logs selected because of their high infestation. The mill study was made in November, 1943, at Cameron and Barton's mill, Cumberland, on trees felled in March, 1941, and is set out in Table II.

The log with the greatest infestation (unnumbered) was unfortunately not seen in its forest situation, but came from the same part of the area as the other logs, and was, therefore, probably felled about the same time. The small girth of the log would be a factor in increasing the proportion of damage as the depth of penetration by Platypodids remains relatively constant regardless of the diameter of the log. Allowance must also be made for a small amount of Lymexylid attack, which caused a larger proportion of the timber to be in the heaviest grade. This mill study indicates that in spite of the general low level of infestation by Platypodids, damage of economic importance has occurred in some situations.

Maximum depth of penetration was about 12 inches, but the majority of entries did not penetrate more than from 6-8 inches. The black stain characteristics of Platypodids was present and noticeable in proportion to the number of entries present.

Lymexylids. It was nearly four years after the fires before traces of Lymexylid attack were first observed in salvaged-felled logs. Infestation has continued to grow steadily, but the severity of attack by the sixth year was still unimportant.

No correlation has been seen between canopy and infestation as was found with the Platypodids.

Heaviest infestation seen was at Toorongo (Newman's area) in comparatively exposed situations, but even here the infestation was light compared with that in some of the dry dumps. Light attack has been observed in salvage-felled logs in the Cumberland, Eastern Tanjil, and Royston Valley area. In November 1942 several logs from Neulyne (Eastern Tanjil) which showed more attack than other logs in the same area, were milled, but no damage could be found in the boards, indicating that the attack had evidently taken place too recently for damage to be caused.

As Lymexylid attack takes place along the cracks in the wood, infestation has been measured by the total length of these lines per unit length of log. The logs were divided into 6 grades according to the severity of attack and when, as in the case of all salvage-felled logs, all logs fell into the lightest grade, the actual length of attack per unit area was used. In either case, however, the severity of attack has been expressed as an "infestation rating," this being the degree of infestation as compared with complete infestation at the highest grade, taken as 100. At Newman's Toorongo) where the highest infestation was found, the infestation rating was 5·2 Lymexylids were present in all these logs, whereas in dry dumps only the interior logs were affected.

TABLE II.—MILL STUDY OF SELECTED SALVAGE-FELLED LOGS SHOWING DAMAGE CAUSED BY MAXIMUM INFESTATION BY PLATYPODIDS AFTER A PERIOD OF FIVE YEARS FROM DEATH OF TREES.

Tree Number.	Entries /ft. Length.	Centre Girth.	Hoppus Vol.	Total Sawn Timber Super Feet.	Recovery Percentage.*	Infested Timber as Percentage of Total Sawn Timber. Entries/Square Foot.			
						1–3.	4–10.	>10.	Total.
		ft. in.				%	%	%	%
191 (3 logs)	12·5	10 0	3,675	2,827	77	3·4	4·2	10·6	18·2
192 (2 logs)	7	13 0	3,422	2,130	62	1·6	0·8	0·7	3·1
193 (3 logs)	13	11 5	4,647	3,508	75	5·2	1·7	1·6	8·5
195 (1 log)	11	13 8	2,801	1,027	37	5·9	2·2	3·1	11·2
— (3 logs)	..	8 6	2,760	2,099	76	0·4	3·6	54·6	58·6
Total	..	..	17,305	11,591	Percentage	3·3	2·5	13·4	19·2

* Includes boards suitable for dunnage only.

A dry-log dump at West Tanjil. [Forests Com. photo.

Dry Log Dumps

Instead of leaving the felled trees on the forest floor as in salvage felling, the trees are headed, end-coated, and the logs hauled to a suitable situation, preferably near an extraction line. Although it was originally planned to apply chemical treatments most of the dry dumps in the present scheme have been left untreated, partly because the effectiveness or otherwise of the treatment was not known.

Dry dumps are normally considered to be a method of short-term salvage only, but many of the present dumps have been in existence for over four years and are not yet being used. Most of these are in the Toorongo area and are in rather exposed situations.

When examined three years after the fires these dumps were remarkably free from borer attack. As far as Platypodids are concerned this freedom from attack appears to be due to the rapid drying out of the logs, particularly the surface logs, but even the interior showed no large scale attack, and in general corresponded to standing tree infestation (q.v.). The physical deterioration of the surface logs appeared to be the only disadvantage of this type of salvage. Small dumps in sheltered situations correspond to salvage-felled logs.

Since that time, however, infestation by Lymexylids has occurred in the Toorongo district and has increased rapidly. Approximately four years after the fires, section of one of the dumps (Area A, No. 3) was milled. From an examination of the dump it had been estimated that 40 per cent. of the logs had Lymexylid attack to a certain degree, but only an average of 18 per cent. of the length of these logs was affected. Section of the dump was milled in February-March, 1943, and boards from 12 logs, not necessarily representative of the whole dump, examined for borer infestation. Damage was found to be as follows:—

	Per Cent. of Sawn Timber.
1-3 entries/sq. ft.	11
More than 3 entries/sq. ft. ..	3

Early in 1944 (5 years after the fires) all dry dumps in the Toorongo area showed heavy attack in the logs in the interior of the dumps, surface logs still showing consistently low, in fact negligible infestation.

Lymexylid attack has been recorded in terms of "infestation rating" as described for salvage-felled logs. In February, 1944, estimates were made by measuring the infestation at different parts of each dump and taking the average, and these figures are given in Table III.

It is noticeable that where a higher proportion of a dump is infested the density of infestation is also greater.

TABLE III.—LYMEXYLID INFESTATION IN DRY LOG DUMPS AT TOORONGO PLATEAU.

—	Volume Million 3′.	Date of Construction.	Percentage of Timber Infested.	Infestation Rating.
Area B—No. 2	1·1	Mar. '41–May '41	24·8	8·6
Mundic Dam	3·8	Dec. '40–May '41	11·9	3·6
Area A—No. 3	2·1	Mar. '41–May '41	18·3	5·5

In the present scheme, therefore, no appreciable borer attack in any district has been observed until more than four years after the fires. Up till this time the physical deterioration of the surface logs has been the chief disadvantage. Beyond four years increasing Lymexylid infestation has occurred and although their life cycle is long and rate of penetration slow, a large proportion of the timber is affected.

SUGGESTED STRUCTURE FOR DRY LOG DUMPS.

At present large interior spaces are present in many dumps due to the fact that the logs are laid criss-cross over each other as they are pulled in from the bush. The fact that borer attack takes place in the inner portion of dry dumps, suggests that building dumps to allow a minimum of access to the centre of the dump by the beetles should be a practicable step towards reduction of damage. This could be accomplished by laying the logs parallel to each other, by which means a maximum of surface area of each log would be in contact with other logs. The rate of drying out would also be reduced by the reduction in air space and diminution of air movement. More sheltered conditions than those at Toorongo would also appear desirable to reduce physical deterioration.

In view of the minor damage by Platypodids and its doubtful effectiveness, treatment with paradichlorobenzene as suggested by Cummins and Turnbull (1939) does not seem justified.

Water-Sprayed Dumps

This method of salvage has not been used previously in Victoria and no information was available as to its effectiveness under Victorian conditions. It has been used as a substitute for complete immersion in water and its efficiency depends on raising the moisture content of the wood beyond the point at which insects can live. The dumps are built in the same way as a dry dump, but the site has to be carefully chosen so that a sufficient volume and head of water can be obtained to keep a system of sprays operating over both summer and winter. This system of rotating stationary water sprays is maintained to give a complete coverage of water mist.

Careful examination of numerous wet dumps in the various salvage districts has failed to reveal any instance of insect attack in any logs over which a constant water spray has been maintained. Platypodid attack has been found present in patches where the water sprays have not provided complete coverage due to bad spacing of the sprays, or to insufficient water supply. Heavy Lymexylid attack was observed in dumps No. 1 and 3 at Limberlost (Tooronga Ash, Area B) where in February, 1944, approximately 10 per cent. and 20 per cent. respectively of the logs in each dump had borers present. In this case the reason is fairly clearly due to insufficient water supply, the sprays being out of operation for long periods. In those instances where borer attack has occurred in wet dumps the reasons can be summarized as:—

Inadequate water supply.
Insufficient number of sprays to give complete coverage.
Interruptions to maintenance.

A water-sprayed dump at Thomson Valley.
[Forests Com. photo.

The frequency with which the spray nozzles become blocked suggests that either an improvement in the filtering system is necessary or that the maintenance is inadequate.

The loose packing of the logs is, in the case of wet dumps, an advantage, as it enables better penetration of the water mist.

In brief, the method of water sprayed dumps has been completely successful in preventing borer attack in all dumps where adequate water coverage has been maintained. The extent of the infestation in certain dumps is a measure not of the efficiency of the method but rather of the efficiency of the original layout and subsequent maintenance of the sprays.

Standing Trees

The infestation of standing trees by either type of borer has been low in all districts. It was observed at the commencement of the survey, (i.e. three years after the fires) that most Platypodid entries seemed to be unoccupied, either due to completion of the life cycle of the insects, or death from unsuitable conditions. At the mills it was found that the entries were extremely shallow, seldom more than a few inches in depth and unbranched. No damage of commercial importance in any district has been found to have been caused to standing trees by Platypodids.

Counts of infestation were made on freshly felled trees whenever the opportunity occurred. The number of trees counted in each district therefore was different from the salvage-felled logs but as no significant differences were found between districts in the case of standing trees they have been compared as a group with the savage-felled logs. The average infestation for standing trees was 1·0 entry/ft. length of standard log.

Comparisons with salvage-felled logs show that standing trees have a significantly lower infestation than either salvage-felled logs at Cumberland (difference highly significant), Royston Valley or Thomson Valley and are significantly higher than salvage-felled logs in the Eastern Tanjil.

A factor of importance in causing the low infestation of standing trees must have been the enormous volume of susceptible material suddenly produced by the fire, in relation to the relatively small amount of breeding material formerly present. By the time one generation of these beetles had been completed much of the standing wood had ceased to be attractive owing to the rapid drying out of the surface wood.

Lymexylid attack has been observed occasionally in standing trees, but the total seen has been too low to be measurable in relation to the total volume of timber concerned.

Up to a period of nearly six years after the fires, therefore, borer attack has not been an important factor in the deterioration of fire-killed trees permitted to remain standing. As pointed out earlier, however, physical deterioration is the important factor under these circumstances.

FACTORS INFLUENCING THE DEGREE OF INFESTATION

1. Platypodids

This group does not appear to attack healthy trees. Diseased and dying trees are susceptible and entries may also occur at damaged points in otherwise healthy trees. Wood of diameter less than 5-6 inches is seldom attacked and dry wood is not susceptible. The degree of susceptibility to attack also diminishes as the wood dries out. Branches are seldom attacked.

The extent of the infestation of susceptible wood is governed by:—

(*a*) The degree of susceptibility.

(*b*) The period over which it remains susceptible.

(*c*) The borer population in the vicinity.

(a) *The degree of susceptibility* varies with the species of tree; in the districts concerned, mountain ash and alpine ash do not seem to be as susceptible as mountain grey gum (*E. goniocalyx*) and myrtle beech (*Nothofogus Cunninghamii*).

Within each species there also appears to be an inherent variation, but in addition, the condition of the tree is important. Platypodids seldom penetrate through the fibrous bark near the base of mountain ash or mountain grey gum. They will penetrate the smooth bark near the head, but attack is later as compared with a barked tree; the beetles will enter through splits in the bark rather than through the bark itself.

Test of Susceptibility to Attack.

A test carried out on mountain grey gum logs freshly felled, to determine the difference in degree of susceptibility to attack showed

freshly exposed sap-wood to be the most susceptible. The smooth bark only was included, as fibrous bark is rarely attacked. The treatments were randomised and repeated five times on each side of the log in strips 14 inches wide.

TABLE IV.—RESULTS OF TESTS TO DETERMINE RELATIVE SUSCEPTIBILITY OF DIFFERENT PARTS OF TREE TO PLATYPODID ATTACK.

	Infestation.		
—	Total.	Average.	Average.
(*a*) Bark left on ..	41	4·1	$\frac{\sqrt{X+0·5}}{1·901}$
(*b*) Sapwood exposed	108	10·8	3·182
(*c*) Heartwood exposed	9	0·9	1·117

Difference required for significance at 5 per cent. level = 0·847.

The difference betwen heartwood exposed and bark left on is not significant, but the sapwood has a significantly higher infestation at the 1 per cent. level than both bark and heartwood.

(b) *The period over which the wood remains susceptible.* The differences between salvage-felled logs and standing trees indicate that the environment is of importance, but this is believed to be due not so much to the attraction of beetles to certain situations as to the effect of the environment in reducing the rate of drying out of the log and hence the length of time it remains susceptible.

The surface wood of standing trees or felled trees in exposed situations dries out rapidly and loses its attractiveness in a shorter time than a log protected from the direct rays of the sun. Similarly the distribution of attack over a log is affected in the same way. A log exposed to the sun is attacked more heavily along the side close to the ground where the wood remains moist over a longer time, while under heavy canopy attack is evenly distributed over all parts of the log. Moisture may be excessive as in the case of wet dumps in which case this factor does not apply.

The high infestation in the Cumberland logs may be due to the fact that in addition to having the type of canopy which decreased the drying out of the logs, the trees themselves appear to be less severely burnt in this area, and, therefore, would tend to remain green for a longer time.

(c) *Sources of infestation.* It is difficult to assess the importance of this factor, although it must be a factor. The infestation of the standing trees is surprisingly uniform, but the low infestation in the Eastern Tanjil may be due to a combination of an initial low population and unsuitable breeding conditions since.

(2.) *Lymexylids.* This group does not seem to be attracted to green wood and has begun its attack on the fire-killed timber at a much later stage than the Platypodids. As the peak of Lymexylid infestation has not been reached definite conclusions are not justified. Attack usually takes place through cracks in the drying surface wood, but not invariably. They have been seen only in Eucalypt logs of a foot or more in diameter. Owing to their much later attack, very few logs have bark on when attacked, but entries have been observed in bark covered logs.

The most noticeable difference in degree of infestation has been in dry dumps, where surface logs have been avoided while heavy attack has occurred in the interior of the dump. The infestation of logs in the interior of dry dumps has been higher than in logs in any other situations.

The salvage-felled logs under heavy canopy at Eastern Tanjil have not shown the same resistance to this group as to Platypodids. The low infestation of standing trees and the surface logs of dry dumps suggests that the more exposed wood is less susceptible to attack.

Summary and Conclusions

Survey work on pin-hole borer attack in fire-killed mountain ash commenced in 1942, three years after the 1939 fires and continued for two and a half years.

Two types of borers have caused damage, Platypodids and Lymexylids. The bulk of the Platypodid infestation occurred within three years of the fires and has, in general, been light and in only one area, and in one type of salvage, has damage of economic importance been seen. The reasons for this are believed to be the wide dispersion of the population owing to the enormous increase in the available breeding material and unsuitable conditions for the development of a large proportion of the beetles after infestation of wood in certain situations.

Significant differences were found in the infestation by Platypodids in salvage-felled logs and are considered to be due mainly to differences in the density of the canopy. A mill

[*Continued on page 524.*

IN THE ORCHARD

Contributed by the Horticultural Division

ORCHARDISTS in the irrigated fruit-growing districts of Harcourt, Bendigo, the Goulburn Valley and Horsham are faced with the prospect of growing their fruit under a considerably reduced water supply this summer. With present indications of a heavy setting of canning peaches and pears, it will be impossible for many growers to bring their crops up to marketable size. Under these circumstances there are several things to do in order to obtain fruit of a reasonable size and to minimize damage to trees and these are:—*use irrigation water to the best advantage, thin out the fruit*, and *destroy all weeds.*

Irrigation Methods.

Make sure that the available water is being used to the utmost advantage. Clean out and repair all supply channels to reduce distribution losses. The all important object in irrigating is to get the water to the root zone. For this purpose, heavy applications that penetrate to three feet at least are preferable to more frequent light waterings which do not wet the soil beyond the surface 8 to 12 inches. Examination of the extent of water penetration with a soil auger after an irrigation will provide a useful guide as to the efficiency or otherwise of the method being used. Where runs are excessively long, the section adjacent to the head ditch may be overwatered, while trees at the end of the run receive insufficient water. Instances have been noted where the reverse conditions operate due to a comparatively steep slope which causes excessive watering at the end of the run. These conditions can be overcome by constructing temporary ditches across the run and limiting the length of run to 3 to 4 chains.

Fruit Thinning.

Fruit thinning at this time of the year is a normal procedure, particularly with some peach varieties, such as Golden Queen. Under present conditions, however, ordinary thinning will not be sufficient and it should be carried out even to the extent of allowing only half the usual number of fruits to remain on the tree.

Weed Control:

Of the various agencies which cause a loss of moisture from the soil, by far the most important are the plants growing in the soil. A cover of weeds proves a serious competitor with the trees, and all cultivation should be aimed at weed control. In a season such as the present when water is in short supply, adequate weed control will enable the fruit trees to make full use of available soil moisture. Instead of the common practice in the Goulburn Valley of allowing wild millet and other weeds to grow during the late summer, cultivation should be continued, because it is during this period of the year that fruit needs moisture to develop size.

Codling Moth

Cover sprays for the control of codling moth should be applied according to the advice of district orchard supervisors. Moths are usually very active during November and, as egg-laying usually occurs during warm spells when temperatures during the early evening exceed 62 F., growers have a fair indication of the danger periods. Spray advice based on lure records is available in all districts and this service should be made use of. Where infestation has been severe in previous seasons, the combination lead-oil spray, 5 lb. lead arsenate paste or 2½ lb. powder in 80 gallons of water, plus ½ gallon white oil emulsion, should be used. This spray should not be used on market

Flood irrigation of pear trees in the Goulburn Valley

pears or apples after December because of the difficulty in removing the arsenical residue. It is quite suitable for canning pears.

With the prospects of variable apple crops, some growers may have portions of their orchards which do not warrant spraying because of the very light crop. The fruit should be completely removed from these unsprayed areas, otherwise they will provide a harbour for the codling moth, which will spread to trees carrying a crop of fruit.

Banding

Bandaging of the trunks of trees is an important subsidiary control measure for codling moth, and bands should be in position by the end of November. For the most efficient use of the bands, all rough and loose bark should be scraped off the trunk and branches of trees. This is particularly important in the use of chemically impregnated bands, some of which will be used in the Goulburn Valley. Where bag bandages are used, regular inspection and destruction of grubs every 8 to 10 days is essential, and this is facilitated by fastening the bandages in position by the use of nails from which the heads have been removed.

Brown Rot

Brown rot causes severe losses in stone fruit in some seasons when the weather is warm and wet, and is difficult to control. The pre-blossom "pink" spray of Bordeaux mixture is a necessary preliminary control measure. A cover spray of dry-mix lime sulphur has been found to give satisfactory control of both brown rot and rust on peaches. Mix together 16 lb. finely ground sulphur, 8 lb. slaked lime, and 1 lb. lime casein spreader, and use in 100 gallons of water. Do not apply later than 6 weeks before harvesting. This spray cannot be recommended for use on apricots because of the risk of injury. For brown rot in cherries, lime sulphur 1 in 80 may be used when the fruit is $\frac{1}{4}$ to $\frac{1}{2}$ grown.

Cherry Cracking

As a preventive measure against the tendency for cherries to crack if rain falls during the harvest period, white oil emulsion used at the rate of 1 in 80 has been successfully used. However, this spray should not be used if lime sulphur has been used for brown rot control.

IN THE GARDEN

By J. L. PROVAN, B.Agr.Sc., Principal, School of Horticulture, Burnley Gardens

"Everlasting" Flowers

THE term "everlasting" as applied to flowers or plants, describes those flowers or parts of plants which can be cut and dried and which retain their shape and colour for some months. One of the best known forms of the everlasting flowers is *Helichrysum,* but many other plants can also be grown and the parts dried and used for decorating at a time when flowers are scarce.

Pampus grass, Craspedia, common "Billy Buttons" which are found growing wild in parts of Victoria, bulrushes found growing in swampy localities, and also some of the larger forms of shell grass can all be used as "everlastings." The flower spikes of many other grasses when dried are also of decorative value.

In addition to these, however, there are some good garden plants, the parts of which can be dried and used for winter decoration. One of the popular types is Honesty (*Lunaria annua*), which is a biennial, that is, it is sown in early autumn and flowers in the spring. The flower, which varies in colour from a light to a deep reddish-purple, makes quite an attractive subject in sheltered and semi-shaded places in the garden, and grows to a height of about 3 feet. This is followed by large flat seed pods which are more or less transparent and of a papery texture, and the seeds are visible through the pod. The seed pod is a little larger than the size of a shilling, and if the outer coverings of the pod are gently rubbed when dry, they can be removed, and this leaves a clear and glistening septum which reflects light and gives it a satiny appearance. These pods, borne in large panicles, make an attractive decoration.

Celosia.

The flowers of the Celosia are almost "everlasting" in that they can be kept for weeks after being cut. Seed of Celosia can now be

sown in the positions in which they are to flower, and when the seedlings germinate they are thinned out to about 9 inches to 1 ft. apart. There are three main forms of Celosia. The plumed form, in which the flowers are of brilliant colours and of a feathery texture, grows to a height of about 12 inches, and the crested cockscomb, which has large, ornamental, velvety comb-like heads, and grows to a height of 12 to 18 inches.

Of the plumed types *Thompsoni magnifica* is obtainable in crimson, scarlet and gold shades, and is one of the finest; *Flame of Fire* is an intense scarlet colour.

The third form is really intermediate between the plumed and crested form and is commonly called the Chinese Wool Flower; this is Celosia *Childsii*, and the flower heads resemble large, loose balls of wool, and grow to a height of about 2 feet.

The best type for growing as an "everlasting" is the crested form. This does well in a light, rich soil, and can be used as an edging. It also makes a good pot plant.

Helichrysum.

Helichrysum is a popular and well-known "everlasting," and is also called the Straw Flower on account of the texture of the petals. It will grow to a height of about 3 ft. and can be sown in autumn or spring. Space the plants about 1 foot apart. Seed can be obtained in mixed and separate colours, which include pink, crimson, rose, salmon, purple and gold.

For drying, the flowers should be cut when the outer ray petals begin to open, then tied in bundles and hung upside down in a cool shady place until they are dry. By hanging them in this way straight stems are obtained.

Statice.

The popular name of *Statice* is "Sea Lavender," and both annual and perennial forms are grown as garden subjects. They are among the most popular of the everlastings and are easily raised from seed. The individual flowers are small and have a strawy texture, but the form of the inflorescence often makes an attractive indoor decoration as well as a pleasing border plant in the garden.

Seed of the annual form—*Statice sinuata*—may be sown in autumn or early spring, where the plants are to bloom, spacing them about 9 inches apart. Blooms may be cut and dried and last for many weeks in this condition.

The following varieties are available:—*Kampf's Tall Improved*, which is a rich blue; *Rosea* is a bright rose colour; *Snow White* is a white, and in addition to these varieties mixed dwarf art shades which grow to a height of about 15 inches are available.

Some of the *sinuata* hybrids should also be grown. *Atrocoerulea*, which is a deep blue, makes a good flower for cutting, and *Bonduelli* is a yellow with slender stems.

Of the perennial forms of Statice, *latifolia*, which is called the "Great Sea Lavender," is one of the best known, and the small tufts of leathery leaves and the immense heads of small flowers, sometimes 2 ft. across and of a purplish-blue colour which appear in January or February, make this plant popular.

THE VEGETABLE GARDEN

Cabbages

Seedling cabbages can be transplanted this month, and for the best results the following varieties should be chosen—*Copenhagen Market, Early St. John's Day, Early Jersey Wakefield* and *Henderson's Succession*. For a succession of cabbages, it will be necessary to sow seeds of *Drumhead* and *All Head* this month, remembering that thin sowing in the seed bed produces strong stocky plants which transplant much better in the summer months.

Cauliflower

Sow seed of *Early Snowball*, and *Early Green Glazed* cauliflowers towards the end of the month. One of the secrets of growing good cauliflowers is to have them ready to transplant by mid to late summer, so that their leaves become well developed during the autumn and the plants are ready to produce good, firm, white heads as the weather becomes colder.

Remember to give them plenty of space—2 ft. 6 in.—3 ft. apart each way will be required, and it is essential to enrich the soil by digging in well decayed manure or compost, and the addition of blood and bone manure at the rate of 3 oz. to the square yard will be found helpful.

Protection from the cabbage white butterfly and cabbage moth will be required now, and arsenate of lead dust, or an arsenate of lead spray containing a small amount of white oil emulsion, will be found the best method of control.

Broccoli

This month, the seed of broccoli, which was sown in September, should now have resulted in good strong plants for transplanting. They require approximately the same distance apart as cauliflowers.

The sprouting forms of broccoli, either the purple sprouting or the green sprouting, are becoming more popular, and they make a good tender green as a change from the ordinary white curds of cauliflower or the green leaves of the cabbage.

Tomatoes

November is a good month to transplant tomatoes in the Southern Victorian districts; in the more Northerly districts the later varieties may be planted out. Tomato plants set out now will grow much better than those which have been transplanted earlier, and usually the incidence of spotted wilt will be found to be less in the plants set out during the warmer weather. Suitable varieties are *Burwood Wonder, South Australian Dwarf, Tatura Dwarf Globe* and *Rouge de Marmande.*

French Beans

Another sowing of beans can be made this month and better growth will also be noticed in this crop than in the crop sown last month. This is another plant which delights in warm, moist conditions. *Brown Beauty* is one of the best varieties to grow. If seed is available, *Hawkesbury Wonder* and *Wellington Wonder* are well worthy of trial. *Canadian Wonder* is an old variety which is still widely grown, but it is necessary to ensure that good clean seed be obtained to have success with this variety.

Climbing Beans

Scarlet Runner beans sown during November and December will usually give better results than if sown earlier. One of the best climbing beans is *Epicure,* and other good varieties are *Kentucky Wonder* and *General McCay.* Sow the seeds at least 1 inch deep and space them about 9 inches apart.

A good plan is to change the position of the beans from year to year, because of the general effect on soil fertility, and also to overcome the ravages of red spider. This latter pest often overwinters on walls and paling fences and if beans are continuously grown in the same position it becomes a most difficult pest to control.

PIN-HOLE BORERS OF FIRE-KILLED MOUNTAIN ASH—*continued from page 520.*

study is given of logs showing the highest infestation. Lymexylids have not caused any severe damage in salvage-felled logs as yet, but infestation is steadily increasing and the maximum time that the logs can be left with safety seems to have been reached.

Dry log dumps showed little Platypodid infestation but the interior logs were heavily attacked by Lymexylids from the fourth year onwards. This method of salvage in its present form is not efficient for long term storage.

The principle of water sprayed dumps was found to be most effective in preventing borer attack but certain inadequacies in maintenance and construction have been pointed out.

Trees left standing have not been damaged to any important extent by borers and as far as Platypodids are concerned, it would appear to be an advantage to leave the trees standing until physical deterioration commences. Lymexylids have not been important up till now, but are increasing.

Factors of importance in affecting the degree of infestation, including a test on relative susceptibility of bark, sap wood and heartwood, are discussed.

Acknowledgments

The survey has been facilitated by the ready co-operation and assistance rendered by all officers of the Forests Commission with whom I have come in contact in the course of the work. I am indebted to Mr. R. W. Bond, Salvage Officer, for details of salvage operations and guidance in the original survey, to Mr. E. J. Williams of the Forest Products Laboratory for advice on statistical method, and to Mr. H. G. Jennings, Forest Officer, for assistance at Tanjil Bren where the bulk of the work was carried out.

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CHERRIES AND GOOSEBERRIES

By RUTH BROMFIELD,
Assistant Fruit Preserving Expert

THE fruit preserving season commences with cherries and gooseberries, which are available in quantity early in December. Both preserve extremely well and, because they are on the market for a short time only, it is particularly desirable to preserve them for out-of-season use.

Both cherries and gooseberries may be preserved in many ways, and will lend variety and attractiveness to the menu during those times of the year when most fruits are scarce or unobtainable.

CHERRIES

Varieties.—Bedford Prolific and St. Margaret are the best of the sweet varieties, having firm flesh, small stones, and light to dark red colour. Of the sour red varieties the Kentish cherries, May Duke and Montmorency are especially suitable for bottling, having a rich and spicy flavour and a bright red colour.

To Bottle Cherries.

Choose firm, clean, ripe fruit. Remove stems and wash. The stones, which impart an almond flavour to the preserve, may be removed if desired. If stones are removed, all juice from the fruit should be saved and used for syrup. For the syrup use 6 oz. of sugar to 1 pint of water for the sweet varieties, and 8 oz. of sugar to 1 pint of water for the sour varieties. Boil together for five minutes, strain through muslin and cool.

The prepared fruit is packed firmly into clean, dry jars, filled to overflowing with cold syrup. Rubbers or inserts, and the lids are placed in position and the filled bottles are placed on a stand 4 inches high in the sterilizer, with sufficient water added to the sterilizer to come just below the surface of the stand. The water is slowly brought to boiling point, and kept boiling for 20 to 25 minutes for quart size jars. The jars may then be removed and overflowed with boiling syrup to prevent the fruit from becoming exposed above the juice on cooling, and sealed immediately by screwing lids firmly or adjusting clips. Examine seal next day. If necessary replace defective rings or inserts and re-sterilize for ten minutes.

When storing wrap the bottled cherries in paper to protect them from the light, as they are inclined to fade. For jams and conserves, it is advisable to use the Kentish cherries—Morello, Montmorency, or May Duke.

Cherry Jam.

Five lb. of cherries (weighed after stoning), 3½ lb. sugar, juice of 5 lemons. Put the fruit and lemon juice with enough water to moisten the bottom of the pan on the fire, and start the fruit cooking. Simmer until the fruit is tender and the mixture is fairly thick. Stir in the sugar, and boil until the jam will set.

Jellied Cherries.

Two cups of tart apple juice, 2 cups of sugar, 1 cup of pitted cherries. To make apple juice, wash some new season's apples, cut up roughly and add enough water to cover. Simmer with lid on pan until apple is soft, strain through muslin. Bring apple juice to boil, add sugar and cherries, with the strained juice of 1 lemon and continue cooking till the mixture will flake from the edge of a spoon. Remove from fire, cool slightly, stir, and then pour into hot jars and seal.

Cherry Butter.

When made from the sour red cherries, cherry butter ranks amongst our choicest fruit products. Cherries are pitted and run through a mincer, using the fine cutter. For each 1 lb of minced fruit allow ¾ lb. of sugar. No water is needed. The fruit is brought to boiling point, then the sugar added, and boiling con-

tinued until the hot pulp will round on a stirring spoon. The hot butter is filled into sterilized jars and sealed.

Cherry Conserve.

Cherry conserve is very popular in America, and makes a delicious preserve. The dark-red cherries are used. One quart of cherries, 1 medium-sized orange, 2 oz. of raisins, 1¼ lb. of sugar, 1–2 oz. of walnut meats, if available. Mince orange, using fine cutter, and boil slowly with 1 pint of water for 20 to 30 minutes. The cherries are pitted and run through the mincer with raisins. The walnut meats may be broken or cut up. When the orange is cooked tender, the cherries and raisins are added and all cooked together rapidly until approximately half the juice has evaporated. The sugar is added and the mixture is cooked until it will round on a spoon. The nut meats are stirred in while the conserve is still very hot, and the conserve is then filled into sterilized jars and sealed.

Candied Cherries.

Montmorency or any firm cherry is adapted for this purpose. Stone carefully, soak in vinegar for 24 hours, then drain. Take equal weights of sugar and cherries, thoroughly mix, then lay the mixture on plates, and keep in a cool place for seven days. Stir well each day. Put in jars and seal. Store in cool place.

Cherry Vinegarette.

Four lb. of sweet cherries, 1 quart of vinegar, 3 lb. of sugar, cup of juice from stewed cherries. Remove stones, place cherries on trays and cover with diluted vinegar (2 cups of water and 1 cup of vinegar), allow to stand overnight. Drain, and cover fruit with syrup made by boiling sugar and cherry juice. Allow to stand in this syrup, in the sun, for three or four days, to plump (i.e., to puff up). Pack into jars and strain the syrup over them. This product may be artificially coloured with cochineal by adding it when the cherries are put in the heavy syrup. If these are packed in small jars, they may be used for cake decorating or in fruit salad.

GOOSEBERRIES

It is worthwhite to buy gooseberries, usually a cheap fruit, in order to build up a supply of bottled gooseberries, which will prove invaluable for pies and tarts. Because of their extreme acidity, they are easily preserved, and being rich in pectin and acid make easily setting jams and jellies.

The fruit is best picked under-ripe, but not too mature, or the preserved gooseberries will have little flavour. For preserving purposes, a green variety of medium size is preferable. Roaring Lion is the best known variety.

To prepare for bottling or jam making, the berries should be well washed and topped and tailed. The strength of the syrup used should not be more than 4 oz. of sugar to 1 pint, or the fruit will shrivel.

Bottled Gooseberries.

The prepared berries should be packed firmly into the jars, and then filled to overflowing with cold syrup. Place fittings on the bottles and sterilize at 170° F. (the water should be simmering) for 20 minutes to avoid cracking the skins. It usually happens that small pearl-like bubbles appear on bottled gooseberries. These usually disappear when the fruit has been stored for a few weeks, and does not mean that insufficient sterilization has been allowed.

Gooseberry Conserve.

Eight lb. of green gooseberries, 4 quarts of water. Boil berries gently until a slightly pink tinge is visible (keep lid on pan to avoid undue evaporation), then allow an equal quantity of sugar to the pulp and juice. Dissolve the sugar and allow to boil rapidly until the mixture jellies when tested. This produces a jellied product of a rich, clear, red colour.

To make an economical "Loganberry" jam, allow 6 lb. of green gooseberries, 6 lb. of loganberries, 2 quarts of water, and 10 lb. of sugar. Boil gooseberries in water for 30 minutes, then add loganberries and cook for five more minutes. Add sugar and after it has dissolved boil rapidly until it crinkles on a cold plate, or flakes off the edge of a spoon. Allow to cool slightly before bottling.

Gooseberry Jelly.

Top and tail the fruit, which should be quite green and fresh. Allow 1 quart of water to each 1 lb. of fruit. If fruit is turning in colour, allow only 1 pint of water. Boil for 1½ hours, then strain through muslin, then flannel. Measure, and add an equal quantity of sugar. Boil rapidly until it responds to setting test.

Gooseberry Chutney.

Four lb. of ripe gooseberries, 1 pint of vinegar, 1½ lb. of sugar, ½ oz. of garlic or 2 minced onions, 1 tablespoon of salt, 1 teaspoon of cayenne, 1 teaspoon of cloves, 2 oz. of raisins or sultanas, and 2 oz. of green ginger.

Top and tail the gooseberries. Peel garlic and cut with ginger into small pieces. Tie garlic and ginger with cloves in a muslin bag. Simmer all together till well blended and no free liquid will separate out (about 1 hour).

Certified Pullorum Tested Flocks

A certified Pullorum Tested Flock is one in which all the breeding stock have given a negative reaction to the agglutination test for pullorum disease, and in which all such stock are kept under rigid conditions of isolation approved by the Chief Veterinary Inspector.

The undermentioned flocks have been certified by the Department of Agriculture, and will remain so until the next breeding season or until such time as the Chief Veterinary Inspector determines.

Full particulars of this scheme appeared in the February, 1942, issue of the *Journal of Agriculture*.

Application forms are obtainable from the Chief Veterinary Inspector, Department of Agriculture, Melbourne, C.2.

Owner.	Number of Birds.
Abikhair, E., 41 Wilfred-road, Ivanhoe, N.21	33
Ackfield, C., Jackson-street, Reservoir	88
Allison, Mrs. M., 30A Glen Eira-avenue, East St. Kilda	11
Archard, N. F., Yeoburn East, via Kerang	181
Armstrong, D. M., Fryer's-road, Campbell's Creek	199
Ashgrove Stud Poultry Farm, Mountain-road, Cockatoo	158
Bantick, H. M., Old Dandenong-road, Heatherton	555
Barastoc Experimental Farm, Central-avenue, Bayswater	229
Barlow, M., Everest-crescent, Olinda	41
Barnes, Mrs. A., "The Heights," Blackburn-road, Blackburn	2,333
Bartholomew, G., St. Arnaud	92
Bartlett, N. M., Pimpinio	338
Bassett, R. A., South Muckleford	143
Batey, L. J., Katandra West	481
Batten, J. H., Central-avenue, Bayswater	672
Beer, Mrs. E. V., Rainbow Lodge, South Kyneton	96
Bentley, F. W., Hastings-road, Frankston	1,080
Best, G. W., Elmhurst-road, Bayswater	166
Bingley, A., 333 Highbury-road, Burwood, E.13	213
Blyth Bros., Rowson-road, Bayswater	166
Chapman, Mrs. E., Vouanmite	237
Christie, Messrs. R. R. and Son, St. Elmo Poultry Farm, Bentleigh	895
Clark, H. N., Bayswater-road, Croydon	2,262
Clegg, R. M., 52 Burns-street, Hamilton	55
Coate, C. J., Donald	70
Coupar, J. E., Nathalia	298
Cox, F. S., and West, C. P., Messrs., Grange-road, Cheltenham	199
Crowle, L. Z., "Monomeeth," Broadford	165
Cumming, H. D., "Larneuk," Naroghid	75
Davidson, A., 22 Sherbrooke-avenue, Ringwood	98
Davies, L. H., Westall-road, Springvale	191
Dawson, L. J., "Hill View," Eversley	151
Dawson, R. G., Maldon-road, Castlemaine	504
Dimoline, W. and Son, Heatherton-road, Noble Park	407
Dixon, Chas. E., Sinclair-road, Bayswater	448
Dookie Agricultural College, Dookie	389
Eastaugh, T. L., Point Nepean-road, Highett, S.21	345
Eastman Bros., Messrs., 52 Landell's-road, Pascoe Vale, W.8	1,732
Elliot, L. J., Blake-street, Nathalia	72
Elson, H., "Osborne," Mornington	104
Emmott, J. T., Verdun-street, Inglewood	212
Evans, Mrs. R., 50 Simpson-street, Kyneton	50
Everard, H. L., Hawkesdale	899
Everist, F. R., "Chota Wallah," Tyabb	39
Fitchett, C. W., Springvale-road, Tally Ho	548
Forbes, Mrs. R., Pental Island, c/o Swan Hill P.O.	294
Gammie, H. C., Tibrockney-street, Highett, S.21	152
Gartner, Miss M. T., 259 Middleboro-road, Box Hill	56
Gibbs, J. L., Shepparton	69
Gillespie, C., Britannia Creek Rd., Wesburn	106
Gillespie, G. L., Katamatite	192
Giovanetti, G. E., Skene-street, Kennington, Bendigo	98
Goddard, Wm J., 356 High-street, Bendigo	158
Gough, L., Clive-street, East Brighton, S.6	103
Graham, C., "All Black Poultry Farm," Portarlington	45
Grant, D., 6 Laurel-grove, Blackburn	63
Greenshields, E. J., Lancefield	431
Greenwood, J., Canterbury-road, Forest Hill	193
Gregson, Mrs. E., Kyvalley	194
Grenville, G. W., "Granville Stud Poultry Farm," Springvale South	2,701
Gwyther, R. P., Valley-road, Highton, Geelong	348
Hall, H. A., Pinnacle Stud Poultry Farm, Lilydale	2,089
Hall, R. H., Wal Wal	370
Hamblin, N. A., "Sunny Hill" Poultry Farm, Toolleen	1,441
Hamilton, A., "Lyncroft," Flinders	321
Hansen, Mrs. M. A., Katandra West	100
Hayes, R., Mt. Dandenong-road, Montrose	217
Hearse, Geo. E., Narre Warren North	76
Hemphill, A. E., "Glenara Poultry Farm," Monegeeta	521
Henderson, C. W., Shepparton East	448
Henderson, W. R., 194 Charman-road, Cheltenham, S.22	11
Hewett, A. T., Central-avenue, Bayswater	470
Hewitson and Phelan, "Golf House," Healesville	157
Hewitt's Poultry Farm, Skene-street, Bendigo	1,056
Hill, A. E., 26 Brenbeal-street, Balwyn	125
Hines Bros., Traynor's Lagoon, via St. Arnaud	970
Hipwell, Mrs. M., Maffra	99
Hobson, F., Oakleigh-road, Lower Ferntree Gully	142
Hockley, N. O., Coleraine-road, Hamilton	41
Horsfall, J. B., Hight-street, Lower Templestowe	1,599
Howden, Mrs. R., High-street, Traralgon	92
Huckle, W. H., Waverley-road, Glen Waverley	187
Hunt, R. R., 365 Highbury-road, Burwood, E.13	821
Jackson, Messrs. C. and H. G., Cadles-road, Carrum Downs	300
Johnson, A., Sunray-avenue, Cheltenham	644
Johnson, A. S., Burwood-road, Lower Ferntree Gully	1,235
Jolly, W., Five Ways, P.O.	245
Kay, L., 90 Pine-street, Reservoir	298
Kidgell, L. L., 34 Mullum-road, Ringwood	234
Kidgell, L. L., 34 Mullum-road, Ringwood	242
Kosch, E. W., Coromby	397
Kostos, D., Cr. Waverley and Collins roads, Oakleigh	658
Langton, Mrs. J., Croydon-road, Bayswater	36
Law, J., Lewis-road, Wandin	191
Lawrence, Mrs M. 107 Albert street, Sebastopol	231
Lennie, Mrs. J. E., "Dumbarton," Mount Scobie, via Kyabram	225
Lucas, G., 4 Downing-street, Blackburn	923
McConnell, R. W., Glenormiston South	884
MacKintosh, Walter C. Neerim South	365
Maclean, Charles C., Kelvinside-road, Noble Park	125
McDonald, J., 43 Bloomfield-avenue, Maribyrnong	92
McDonald, J. L., Lyons-road, Croydon North	288
McDonald, Mrs. E. M., 114 Barkly-street, Ararat	171
McDonald, R. A., "Barton," Moyston P.O., via Ararat	153
McErvale, P., Boronia-road, Vermont	2,515
McLaughlin, K. A., Dandevue Poultry Farm, Bayswater	793
McLaughlin, S. E. V., "Sutton Park," Hull-road, Croydon	191
McLeod, Miss K., "Hayfield," Digger's Rest	93
McNamara, O. J., 24 Sherbrooke-avenue, Ringwood	1,105
Maher, Allan E., "Alandale," Wal Wal	772
Mair W. P., Tyabb	43
Major, W. R., Girgarre	105
Mead, J. L., 28 Golf Links-avenue, Oakleigh, S.E.12	52
Meager, E., 12 Kennedy-street, Bendigo	21
Messenger, C., 240 Rathmines-street, Fairfield, N.20	136
Miceli, Mrs. G., Monbulk	110
Moller, F. C., Warburton-road, Lilydale	48
Molson, W. E. 188 Blackburn-road, North Blackburn	649
Moore, H. A., Warrandyte-road, Ringwood North	660
Mumford, L. J., Steele-street, Healesville	348
Mynott, J. B., Bridgeland Park Estate, Main-road, Eltham	102
Nemet, P., Spring Vale-road, Spring Vale South	1,107
Nichols, Mrs. E. M., Yan Yean	662
Nicholson, C. A., 93 Doncaster-road, Box Hill	81
Orange, Mrs. C., Marong	170
Overman, C. J., Vernal-road, Mitcham	596
Owens, H. C., Waverley-road, Glen Waverley	69
Pearse, Mrs. H. F., Box 33, Donald	339
Peel, C. W., "Callemondah," Gnarwarre	294
Petrie, R. W., St. Arnaud North	146
Pobjoy, J., Patterson-road, Springvale South	523
Poole, A., Hull-road, Mooroolbark	318
Pooley, F. W., Canterbury road, Blackburn	257
Poulton, A. W., Vickers-street, Sebastopol	1,077
Rae, J., 277 Albert-street, Sebastopol, Ballarat	729
Ridge and Son, 42 Myrtle-grove, Blackburn	1,056
Ridgway, Geo., Callander-road, Noble Park	155
Robbins, R. B., Derby	83

Owner.	Number of Birds.
Robson, F., 16 Nelson-street, North Wonthaggi	12
Rushton, J. A., 11 Barker-avenue, Shepparton	609
Salmond, J. B., Deer Park	120
Sanders, A., Stud-road, Wantirna	373
San Miguel, Mrs. M. H., Woodhouse-grove, Box Hill	2,253
Schulze, Mrs. C. A. E., Box 52, Dimboola	206
Scouller, R. C., Tarrant-street, Cobden	243
Seear, W. "The Ranch," Station-street, Wesburn	195
Sleigh, H. R., High-street, Templestowe	173
Shipp, R., P.B., Kerang	492
Simmons, J. T., 6 Lindsay-avenue, Murrumbeena	8
Simpson, G. D., May-road, Glen Waverley	1,975
Skinner, Mrs. M. F., Princes-highway, Noble Park	76
Smith, E., Valley-road, Highton, Geelong	554
Smith, F., Lenham Poultry Farm, Terang	2,025
Smith, L. I., "The Ranch," Burwood-road, East Burwood	117
Spry, W. P., "Esswill," Culgoa	707
State Research Farm, Werribee	363
Stephenson, Mrs. E., Beard-road, Research	300
Stewart, J. A., Maldon-road, Castlemaine	777
Stewart, P. D., Bayswater-road, Croydon	22
Stiles Bros., "Fair View," Wallan	976
Streeter, H. A., Avoca	157
Sutcliffe, W., 71 Botanic-road, Warrnambool	104
Sutherland, J. M., Fulton-road, Box Hill	867
Sweeney, J. J., Tarara Stud Poultry Farm, 55 Rundle-street, Ararat	401
Swift, D. A., Kangaroo Flat	519
Taylor, E. D., Walker-street, Sebastopol	846
Throup, N. C., Neerim South	91
Throup, R. E., Neerim Poultry Farm, Neerim South	199
Travaglia, V., St. Arnaud Poultry Farm, St. Arnaud	876
Trinca, M., Valley-street, East Oakleigh	1,123
Triplett, C. A., Muskerry, via Goornong	184
Waldmann, F., Greythorn-road, North Balwyn, E.9	1,111
Walker, Mrs. E. H., Lancefield	173
Walters, V., High-street, Lower Templestowe	79
Wanliss, W. J., Springvale-road, Springvale South	684
Webb, A. E. H., Wimbleton Poultry Farm, Frankston-road, Cranbourne	2,848
Welch, T. A., cr. Bayswater-road and Central-avenue, Bayswater	765
West-Onley, K. E., "Len-lea," St. Arnaud	82
White, G. J., Watson's-road, Glen Waverley	818
White Bros., Stewart Road, Clarinda	129
Williams, V., Wangaratta Hatchery, Wangaratta	605
Wimhurst, J. C., Tongala	405
Winter, G., "Denehurst," Murgheboluc	385
Wohlers, S., Jung	377
Wright, A., Congupna Township, via Tallygaroopna	95
Youl, R. S., Wycherley, Wedderburn	1,127

Home Preservation of Eggs

By RUTH BROMFIELD, Assistant Fruit Preserving Expert

WITH the possibility of eggs being scarce or rationed next year, many housewives are expected to take advantage of the present plentiful supplies to put by a stock for use in the autumn and winter months.

A number of methods of egg preservation may be used, but certain precautions should be taken to ensure that the eggs are suitable for preserving. For example, the eggs must be clean, but they should not be washed so that the bloom is removed; they should be inspected carefully for cracks; and if possible they should be infertile, as infertile eggs will keep much longer than fertilized eggs.

To preserve eggs for any length of time the air must be excluded. This may be accomplished by covering them with fat, wax, strong brine or lime water, or by packing them in sawdust. Eggs also may be kept fresh for months by packing them, small ends down, in a bed of ordinary coarse salt, in a cool dry place. The shells should not come in contact, and each egg should stand upright.

Recipes for Reliable Preservatives

1. Mix one teaspoon of sulphur with five tablespoons of vaseline. Boracic acid may be substituted for the sulphur. Smooth a thin layer over each egg and store in a wire basket or container which will allow the air to circulate through the eggs.

2. Fill a kerosene tin with uncracked eggs. To one part of water glass, add nine parts of water (which has been boiled and allowed to become tepid), and stir thoroughly. When the mixture is cold, pour it gently over the eggs using sufficient to immerse them. One quart of water glass and nine quarts of water will generally cover 30 dozen eggs. Keep the vessel covered and in a cool place.

3. To each three gallons of water mix one pint of freshly slaked lime and half pint of common salt; immerse the eggs and cover with a board sprinkled with lime and salt.

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Issued by direction of the Hon. N. A. Martin, M.L.A., Minister of Agriculture.

SUBSCRIPTION RATES

The Journal is issued monthly. The subscription, which is payable in advance and inlcudes postage, is 3s. per annum for the Commonwealth and New Zealand, and 5s. for the United Kingdom and Foreign Countries. Single copy, Threepence. Subscriptions should be forwarded to the Director of Agriculture, Melbourne, C.2.

POSTAGE RATES

The postage required for this issue is:—To Australia and New Zealand, 1½d.; to United Kingdom, 2½d.; to United Kingdom via All-sea Route, 1½d.; to other British Possessions, 2½d.; to U.S.A. and Foreign Countries, 3½d.

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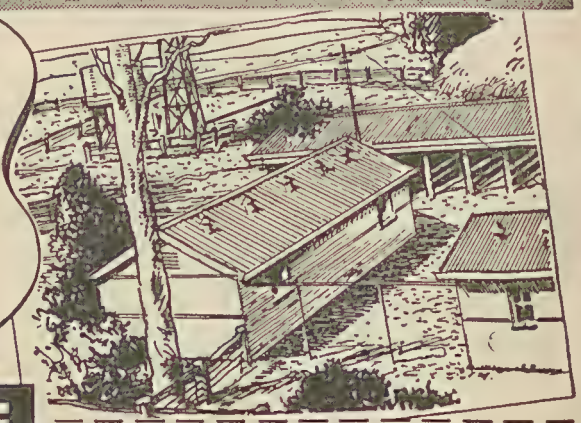

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ASSOCIATION HERD TEST

Annual Report, 1943-44

By W. J. YUILL, Supervisor of Herd Testing

Mr. J. Bullingham's grade Friesian herd of 37 cows averaged 10,257 lb. milk, and 365 lb. butterfat.

FROM its inception in 1921 the herd-testing movement steadily expanded until in 1932 when 104,000 cows were under test on 3,383 farms. This healthy growth was due to the stimulus provided by the Department of Agriculture in arranging district campaigns, field days, and tours by the Better Farming Train. Up to 1932 there had been a marked increase in cow-yields and Association tested-herd averages, but in the depression years development was seriously retarded.

The State and Commonwealth Government subsidies during the earlier period of the herd-testing movement brought test fees well within the range of the small herd-owners. When the Commonwealth Government subsidy was withdrawn early in the depression years and the prices of dairy products had fallen considerably, a large number of small-herd owners withdrew their herds from the test. However, many dairy farmers felt the loss of the tester's report and began to reorganize units, so that upwards of 80,000 cows were under test again by 1939. The upward movement ceased however with the outbreak of the present war, when large numbers of dairy farmers and farm workers joined the forces. On many farms the remaining workers found that they had little time to spare after milking, and consequently other farm work had to be neglected. Elderly people in many cases were not equal to the strain of carrying on and herds were greatly reduced or sold.

In some areas, the better working hours, and more attractive prices associated with growing flax, potatoes, and onions, and other vegetables drew workers away from dairying. In these circumstances, the volume of organized herd-testing receded, until in 1942 it reached the lowest level since 1925—only four years after the inception of organized herd-testing in this State.

The general condition of the movement was reflected at the Annual Conference on Herd Testing held in 1943, when less than twenty delegates attended—a striking contrast with the large and enthusiastic gatherings of past years. As a result of this meeting a deputation waited on the Minister of Agriculture (Mr. N. A. Martin), and directed attention to the serious position into which the industry and testing work generally had drifted. Subsequently the State Government decided to grant an increase in the subsidy for grade herd testing, and the Department of Agriculture provided free tuition for training herd-testers.

Mr. M. Drane's mature cow "Blackwood Park Charm" occupies fourth position in the list of twenty leading cows, with 629 lb. butterfat.

Over 50 of the qualified herd-testers now at work were trained at these special classes at Burnley College.

Of the 63 testers now operating, more than half are women—including 24 members of the Australian Women's Land Army. Since few men are yet available, it is obvious that the organization is finding their help extremely valuable. A serious difficulty, however, is the acute shortage of transport from farm to farm.

During the past three years there have been periods when it was feared that essential glassware would be unobtainable. Certain stocks were purchased by the Central Council however, and these have been sufficient to keep all units at work. The danger of future shortages has now been removed, all material, including Babcock Test Outfits, now being made in Victoria.

Identification of Herd Tested Cows

One condition on which the increased subsidy may be obtained is that all tested cows shall be identifiable, and also, in future, all heifer calves must be tattooed by the herd-tester as early in life as possible. The system now in use was recommended by a special committee to the Annual Herd-Testing Conference in 1939. Some reports being forwarded to the Department from district associations show a serious lack of details concerning the identification of cows under test. Since provisions of these details is necessary in order that the conditions upon which the subsidy is granted may be complied with, the District Association executives must see that they are supplied. As the Herd Tester's Certificate is issued subject to annual endorsement, failure of the tester to supply the required details will endanger the endorsement of the certificate and the payment of the subsidy.

In order to assist the herd-tester and the Association a Register will be issued to each unit of each Association, so that the details of each animal, when obtained, shall be registered for future use. This Register has a special value for the identification of all test cows, heifer calves, and herd sires especially when a new tester is engaged.

The Year's Work

During the year the lowest average yield was recorded since the 212-lb. butterfat average of 92,943 cows in the drought year of 1934. The 27,346 cows which averaged 223 lb. butterfat on this occasion were affected by the long dry summer and autumn, as well as the low condition at calving, consequent upon the lack of fodder reserves during the previous winter. Owing to labour shortage not nearly so much hay or silage was reserved, while the short

"Heather," fifth cow on the "best twenty list". This cow, owned by Mr. D. Fehring, Rochester, produced 621 lb. butterfat.

supply of concentrates after calving also affected the position. Another cause of the low average figure was the late commencement of operations where herd testing was being revived, early-calved cows losing many weeks at the beginning of their lactation. These and other factors have operated to depress the average yield to the lowest point for ten years.

"Dim," the top cow of Mr. J. Bullingham's herd, produced 15,145 lb. milk, and 521 lb. butterfat.

The Irrigation Areas

Generally the Goulburn area returns an average yield that in normal years is greater than that of Gippsland, despite the preponderance of tested cows in the South-Eastern province. The assured water supply for irrigation purposes in the Goulburn Valley during most of the season and the higher rainfall in Gippsland are mainly responsible for the better returns obtained in these two districts in normal years. In the 1939 season, when a "spring in the autumn" occurred, however, little difference was shown in the average returns from the Western, North-east, Gippsland, and the Goulburn Valley irrigation districts, although the latter was still ahead of all other parts of the State.

During the year under review, only five associations exceeded the 250 lb. butterfat level. They included Stanhope, 865 cows, 268 lb. butterfat; Cohuna, 1,078 cows, 265 lb. butterfat; Rochester, 677 cows, 262 lb. butterfat; and Tongala, 715 cows, 258 lb. butterfat—all in the Goulburn Valley area. Korumburra No. 1 Unit was the only Association to exceed the 251 lb. average butterfat yield of all the 5,931 cows in the 185 herds in the irrigation area.

In the 1939 season, the average yield of all tested cows exceeded 260 lb. butterfat, the leading five units having average yields of more than 300 lb.

HERDS OF LESS THAN 20 COWS.

Owner.	Association.	Cows.	Butterfat.
			lb.
Taylor and Weise	Rochester ..	11	433
H. S. Woodman	Rochester ..	13	378
H. E. Keele ..	Rochester ..	18	377
P. Byrne ..	Narracan ..	11	365
N. Norman ..	Tongala ..	19	352

LEADING HERDS, NUMBERING 20 TO 49 COWS.

Owner.	Association.	Cows.	Butterfat.
			lb.
D. Fehring ..	Rochester ..	20	430
C. H. Petersen ..	Korumburra ..	22	411
W. Hornsby ..	Cohuna ..	41	394
Les Ludeman ..	Ecklin ..	30	390
L. Jones ..	Korumburra ..	29	384
A. Lee	Cohuna ..	28	382
J. G. Bamford ..	Ecklin ..	37	376
C. Ronalds, No. 1	Traralgon ..	40	371
C. C. Johnson ..	Myrtleford ..	31	367
A. C. Tack ..	Korumburra ..	29	366
J. Bullingham ..	Tongala ..	37	365
E. McKenzie ..	Kerang ..	28	361
W. R. Orr ..	Stanhope ..	26	360
J. E. McCarrey ..	Kerang ..	36	350
C. V. Ludeman ..	Ecklin ..	45	350
H. Barr ..	Cohuna ..	32	348
J. Martin ..	Stanhope ..	49	347
T. Gaw ..	Bass	40	347
C. and L. Winchcomb ..	Rochester ..	31	346
W. Harris ..	Dumbalk ..	37	344
F. Dineen ..	Toora ..	24	344
W. Wood ..	Tallangatta ..	44	342

Mr. H. E. Keele's herd of 18 grade Jerseys averaged 377 lb. butterfat.

Leading Herds

It has been found necessary to prepare lists of different-sized herds to give prominence to the number of remarkably efficient herd performances recorded.

HERDS OF MORE THAN 50 COWS.

Owner.	Association.	Cows.	Butterfat.
			lb.
Truscott Bros. ..	Toora–Welshpool	65	326
Mrs. S. Emmett	Stanhope ..	54	312
E. A. Thompson	Kerang ..	65	300
L. V. Brown ..	Tallangatta ..	63	299
J. Nichol ..	Tallangatta ..	64	293
L. J. Affleck ..	Traralgon ..	67	274

Eighty herds exceeded the 300-lb. butterfat level. Of this number less than 30 had average yields above the 340-lb. mark, while only three exceeded the 400-lb. level. In 1939, 430 herds exceeded the 300-lb. butterfat level.

Messrs. Taylor and Weise, of the Rochester Association, head the list with their small herd of eleven cows, which had the excellent figures of 433 lb. butterfat, including two 500-lb. producers. H. S. Woodman and H. E. Keele, of the same Association, also have excellent returns. Mr. D. Fering's herd, from the same Association, has a more imposing record, for there are twenty cows in a splendid average yield of 430 lb. butterfat. An interesting fact concerning this herd is that no form of concentrate is fed. Five of the mature cows had records of more than 500 lb. butterfat, three being mentioned in the "best twenty" for the year. "Heather," the top cow, produced 621 lb. butterfat.

Mr. C. H. Peterson, of Korumburra, had the good figures of 411 lb. butterfat from his 22 cows, and leads all the Gippsland herds.

Mr. W. Hornsby, 41 cows, 394 lb. butterfat; Mr. P. Lee, 28 cows, 382 lb. butterfat; and Mr. H. Barr's 32 cows, 348 lb. butterfat, helped materially to bring the Cohuna Association into second place among all associations mentioned in this report.

Mr. L. Ludeman, 30 cows, 390 lb. butterfat, and Mr. J. G. Bamford, 37 cows, 376 lb. butterfat, occupy the leading places in the Ecklin Association.

At Korumburra, Mr. L. T. Jones leads all Gippsland herds other than Mr. C. H. Petersen, his 29 cows having the splendid figures of 384 lb. butterfat, while Mr. A. C. Tack, with the same sized herd, has the herd average of 366 lb. His farm is at Triholm, near Korumburra.

Mr. C. Ronalds' No. 1 herd, of 40 cows, headed the Traralgon Association, with the splendid yield of 371 lb. butterfat, while Mr. C. C. Johnson, 31 cows, had the leading figures for the North-East with 367 lb. butterfat.

Among the large herds, those that reach or exceed the 300-lb. butterfat level must be appreciated, for it is much more difficult to obtain high average yields when the herds are large. Messrs. Truscott Bros. have the excellent average yield of 326 lb. butterfat for their large herd of 65 cows. Mrs. S. Emmett, of Stanhope, has an unusually even producing herd with many good young cows. Mr. E. A. Thompson, of Kerang, and Mr. L. V. Brown, of Tallangatta, have similar sized large herds, with similar average butterfat yields, the latter missing the 300 lb. mark by one lb. butterfat.

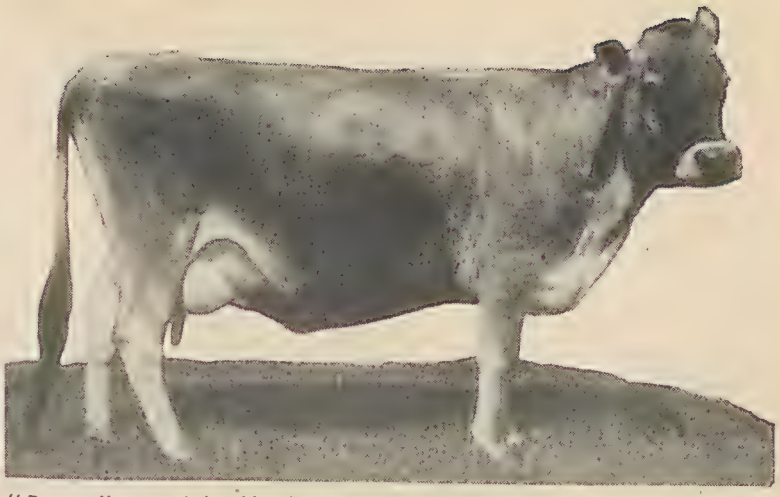
Highest Producing Cows

Only 2 lb. butterfat separates the three highest yielding cows of the year. Mr. T. Vagg's grade cow "Edith" and Mr. T. Findley's registered Jersey "Glenloth Marina" each produced 631 lb. butterfat, while the leading position is filled by "Nigger," a grade cow owned by Mr. H. T. Tomlinson, of Tongala. These cows all have heavy milk yields and high butterfat percentages.

Mr. M. Drane's registered Ayrshire "Blackwood Park Charm" followed her record yield of 835 lb. butterfat with one of 629 lb. This she did despite a severe sickness from poisoning. Mr. O. S. Martin, also of Traralgon Association, has a remarkable grade cow in "Fleck." This cow's yield to date is now over 2 tons of

butterfat. On this occasion she narrowly missed the 600 lb. mark. There are few such cows of any breed in the industry.

Mr. D. Fehring, of Rochester, owns "Heather" 621 lb., "Jessie" 582 lb., and "Beauty" 576 lb. Two others also exceeded the 500 lb. mark. They materially assisted to bring this select herd into such prominence in this report. Four of Mr. Lee's herd at Cohuna exceeded the coveted level of 500 lb. butterfat, the leader of the herd being "Duchess" with 11,330 lb. milk and 582 lb. butterfat. Mr. G. Vallance's three-year-old "Bessie" (567 lb. butterfat) and Mr. J. Burke's "Della" 552 lb. also hail from Cohuna. "Mavis" 564 lb. butterfat, comes from Mr. R. Hollyoak's leading herd at Leongatha; while "Penny" 561 lb. is a member of the leading herd in Korumburra No. 1 unit. Mr. L. T. Jones also owns "Dawn" the last cow on the list. Mr. W. Wood and Mrs. M. Parks of Tallangatta represent the North-east test, while the remaining cows in the list come from farms in the irrigation areas.



"Beauty," owned by Mr. D. Fehring, is included in the "best 20" list. This cow yielded 576 lb. butterfat.

Only five of the four-year-olds exceeded the 500 lb. butterfat level. They are led by the 534 lb. yield of "Molly" a grade cow owned by Mr. J. S. Thewlis. Mrs. Ena McKenzie's "Pellew Lass," 516 lb., Mr. L. T. Jones' "Gladys" 514 lb., and Mr. D. Findley's "Glenloth Madonna," 513 lb., have similar butterfat yields from varying milk weights, Mr. Jones's grade cow having the highest butterfat test, while Mr. J. S. Bullingham's grade fresian "Betty" 505 lb. butterfat, has the highest milk weight, her yield being 13,518 lb.

Mr. G. Vallance's remarkable three-year-old "Bessie," as far as can be ascertained, has created a record for this age in Association test. Her record of 10,069 lb. milk and 567 lb. butterfat was good to secure eleventh place for the year among all tested cows.

The remaining animals in this section have similar yields, Mr. A. Tack's "Connie" from Korumburra gaining a lead on her improved milk yields. The top six two-year-olds exceeded the 400 lb. level, the section being led by Mr. Lyell's "Norma" with 469 butterfat, a grade Jersey with a high average test. Second place was filled with a similar producer in "Ruby" owned by Messrs. Taylor and Weise of Rochester. Mr. T. S. Farrant of Cohuna, Mr. E. McKenzie, of Kerang, and Mr. T. R. Edwards, of Rochester, have heavy milking heifers with medium test; but all have butterfat yield well over the 400 lb. mark. Mr. Keele's "Dolly" is sixth with 419 lb. butterfat.

An interesting feature of the Association test work is that there are now more pure-bred bulls being used, than there are herds under test.

Fodder reserves on a Tongala irrigation farm.

This does not mean that every member is using a pure-bred bull, for some are using more than one.

There are doubtless many performances among the tested herds which would call for appreciation, if all the difficulties associated with present day conditions were fully known. The real ability of our herds will not be known until normal times return.

Twenty Leading Cows with Details of Ownership, Identification and Production.

Owner.	Association.	Name of Cow.	Identification.	Milk.	Test.	Butterfat.
				lb.	%	lb.
H. T. Tomlinson ..	Tongala ..	Nigger	T.12. 18 ..	11,065	5·7	633
T. Vagg	Pakenham ..	Edith	Gr. Jersey ..	12,378	5·1	631
D. Findley	Leongatha ..	Glenloth Marina ..	Reg. Jersey ..	11,487	5·49	631
M. Drane	Traralgon ..	Blackwood Park Charm	Reg. Ayrshire	13,054	4·82	629
D. Fehring	Rochester ..	Heather	R.31. 13 ..	10,501	5·91	621
O. S. Martin	Traralgon ..	Fleck	E.7. 154 ..	12,251	4·85	594
A. Lee	Cohuna ..	Duchess	G.40–73 ..	11,330	5·1	582
D. Fehring	Rochester ..	Jessie	R.31–12 ..	11,022	5·27	582
D. Fehring	Rochester ..	Beauty	R.31–24 ..	9,345	6·15	576
D. McDonald	Kerang ..	Lovely	H.53–79 ..	8,610	6·6	569
G. Vallance	Cohuna ..	Bessie	G.7, 5 ..	10,069	5·3	567
W. R. Hollyoak ..	Leongatha ..	Mavis	L.12–9 ..	9,600	5·86	564
L. T. Jones	Korumburra ..	Penny	K.56–13 ..	9,489	6·0	561
J. Burke	Cohuna ..	Della	G.49–1 ..	12,562	4·3	552
C. and L. Winchcomb ..	Rochester ..	Champion ..	R.17–10 ..	10,279	5·46	551
H. Keele	Rochester ..	Sheila 2nd ..	R.1–68 ..	9,116	6·04	551
C. Runciman	Swan Hill ..	Sapphire 8th ..	Reg. Jersey ..	9,468	5·81	550
W. Wood	Tallangatta ..	Beautie	T.47– ..	9,850	5·56	548
Mrs. M. Park	Tallangatta ..	Dorothie ..	T.31–79 ..	8,392	6·53	548
L. T. Jones	Korumburra ..	Dawn	D.9–101 ..	9,458	5·8	544

The Five Best Four-year-olds.

Owner.	Association.	Name of Cow.	Milk.	Test.	Butterfat.
			lb.	%	lb.
J. S. Thewlis	Pakenham	Molly	8,592	6·24	534
E. McKenzie	Kerang	Pollew Lass ..	11,596	4·4	516
L. T. Jones	Korumburra ..	Gladys	8,175	6·3	514
D. Findley	Leongatha	G. Madonna ..	9,226	5·56	513
J. Bullingham ..	Tongala	Betty	13,518	3·4	505

The Six Best Three-year-olds.

Owner.	Association.	Name of Cow.	Milk.	Test.	Butterfat.
			lb.	%	lb.
G. Vallance	Cohuna	Bessie	10,069	5·3	567
A. Tack	Korumburra ..	Connie	8,711	5·65	492
T. Vagg	Pakenham	Y. Annie ..	7,738	5·92	459
C. H. Pedersen ..	Korumburra ..	Pet	7,671	5·91	453
N. Norman	Tongala	Nancy	6,819	6·6	452
L. Brown	Tallangatta ..	181	7,728	5·75	445

The Six Best Two-year-olds.

Owner.	Association.	Name of Cow.	Milk.	Test.	Butterfat.
			lb.	%	lb.
L. Lyell	Ecklin	Norma	7,875	5·96	470
Taylor and Weise ..	Rochester	Ruby	7,463	6·13	458
T. S. Farrant	Cohuna	Audrey	9,280	4·6	433
E. McKenzie	Kerang	Tilly	9,097	4·6	425
T. R. Edwards ..	Rochester	Rosita	8,933	4·7	420
H. Keele	Rochester	Dolly	7,482	5·59	419

Associations Grouped According to Area and Production.

Association.	Herds.	Tested Cows.	Percentage of Heifers under Five Years.	Number of Pure Bulls.	Average lb. Butterfat.
Gippsland Area.					
Korumburra, No. 1	26	858	58	25	252
Dumbalk North	22	765	46	25	239
Loch	23	820	52	10	238
Bunyip	13	280	63	11	236
Leongatha	33	1,146	51	44	235
Korumburra 3	27	942	60	28	230
Gainsborough	22	971	56	28	229
Korumburra 2	27	1,123	61	22	227
Pakenham	32	625	64	28	222
Traralgon	27	1,296	47	30	221
Bass	27	782	58	25	221
Toora–Welshpool	20	802	47	18	214
Kongwak	22	854	56	18	207
Boolarra	32	1,106	55	35	197
Narracan	36	943	55	25	194
Area details and average butterfat per cow	389	13,313	58	372	222
Western Area.					
Camperdown	22	867	42	22	226
Ecklin	23	808	41	17	216
Mortlake	23	1,018	51	19	212
Paschendale	21	1,023	50	29	209
Ballarat	26	568	50	27	208
Port Campbell	28	942	46	36	197
Paschendale 2	13	825	33	43	155
Area details and average butterfat per cow	156	6,051	46	193	200
North-eastern Area.					
Tallangatta	22	1,097	38	36	231
Kiewa	(Returns not to hand.)				
Myrtleford	30	954	60	27	214
Area details and average butterfat per cow	52	2,051	60	63	219
Goulburn Valley Area.					
Stanhope	25	865	65	25	268
Cohuna	26	1,078	62	26	265
Rochester	24	677	54	24	262
Tongala	26	715	56	28	258
Swan Hill	30	861	61	27	247
Kerang	30	1,092	63	16	246
Undera	24	643	59	31	223
Area details and average butterfat per cow	185	5,931	60	177	251

Summary of Herd Test Data for the Year Ended 30th June, 1944.

Area.	Units.	Herds.	Cows.	Junior Cows under Five Years.		Pure Bred Bulls.		Average Number Cows in Herds.	Average Production per Cow.		
				Juniors.	Per Cent.	Bulls.	Per Cent.		Milk.	Test.	Butter-fat.
Gippsland ..	15	389	13,313	7,362	58·0	372	97·0	34·0	4,707	4·72	222·0
Western ..	7	156	6,051	2,797	46·0	193	123·0	32·0	4,353	4·3	200·0
North-Eastern	2	52	2,051	1,230	60·0	63	121·0	39·0	4,649	4·63	219·0
Goulburn Valley	7	185	5,931	3,599	60·0	177	96·0	32·0	5,420	4·63	251·0
Totals ..	31	782	27,346	14,988	54·0	805	103·0	35·0	4,740	4·7	223·0

1,200 cows from Kiowa Valley Association are not included in this Report.

DATA OF PREVIOUS YEARS.

Year.	Units.	Herds.	Cows.	Juniors.	Per Cent.	Bulls.	Per Cent.	Average Number Cows in Herds.	Milk.	Test.	Butter-fat.
1942–43 ..	25	623	22,154	(Details affected by war conditions)				35·0	4,959	4·7	237·0
1941–42 ..	40	946	34,218	,,	,,	,,	,,	36·0	4,960	4·74	235·0
1940–41 ..	70	1,645	60,108	25,988	42·6	1,390	85·0	36·0	5,200	4·7	245·0
1939–40 ..	101	2,346	84,690	34,723	41·2	2,004	85·0	36·0	5,450	4·79	261·0
1938–39 ..	100	2,275	79,805	34,248	42·9	1,904	83·6	35·0	4,749	4·7	221·0
1937–38 ..	104	2,401	86,048	37,467	43·5	1,969	83·0	36·0	4,876	4·7	227·0
1936–37 ..	107	2,350	80,528	36,106	45·0	1,874	81·0	34·3	5,076	4·80	244·0
1935–36 ..	108	2,416	80,817	37,817	47·0	1,946	81·0	33·0	4,934	4·7	233·0
1934–35 ..	113	2,446	79,701	36,116	45·3	1,991	81·4	32·6	5,309	4·59	244·0
1933–34 ..	134	2,910	92,953	43,394	46·0	2,214	76·0	31·7	4,723	4·51	212·0
1932–33 ..	141	3,383	104,009	46,392	44·6	2,619	77·0	31·0	5,290	4·55	241·1
1931–32 ..	130	3,098	89,619	36,946	41·3	2,323	75·6	29·0	5,393	4·58	247·3
1930–31 ..	132	3,085	90,360	32,867	36·4	2,251	73·0	29·0	5,383	4·30	234·0
1929–30 ..	116	2,604	76,032	24,439	32·1	1,653	71·0	29·0	4,944	4·59	226·1
1928–29 ..	96	2,229	63,277	19,246	30·4	1,354	64·0	30·0	5,080	4·38	223·3

VETERINARY SCHOLARSHIPS

The Victorian Government has decided to award three scholarships to enable selected Victorian students to undertake the course in Veterinary Science at the Melbourne and Sydney Universities. The scholarships will be tenable for five years, the first of which will be spent at the Melbourne University and the remaining four at the Veterinary School of the Sydney University. Fees for the first year of the course at Melbourne will be paid, and for the remaining four years, in addition to the Sydney University fees, the Scholarship holder will receive a living allowance of £100 per annum.

Seven of these scholarships were granted several years ago and six of the holders have since graduated and are now employed by the Victorian Department of Agriculture. The seventh holder is at present with the Royal Australian Navy. An additional four scholarships were awarded last year and the holders are at present completing the first year of the course.

The scholarships are available only to males under the age of 25 years, and who are qualified to matriculate and be admitted to the University course for the degree of Veterinary Science.

The selected applicants will be required to enter into an agreement that, subsequent to graduation, they will be willing to accept a position in the Department of Agriculture, or practise as Veterinary Surgeons in Victoria for a period of three years.

Applications setting out full name, address, age, scholastic attainments, and other relevant information should be made to the Director of Agriculture, Melbourne, C.2. The closing date for the receipt of applications is 20th January, 1945.

A Progress Report *on the* Citrus Rootstock Trial at Irymple

J. L. PROVAN, B.Agr.Sc., Principal, School of Primary Agriculture, Burnley
C. E. COLE, B.Agr.Sc., Senior Horticultural Research Officer

An account of the more evident results from a 6-acre rootstock trial with orange trees established by the Department of Agriculture in the Mildura irrigation district in 1934 is given in the following pages. At this stage, because of the pressure of war work, it is not possible to give a detailed description of the establishment of the trial, nor can the accumulated records be thoroughly examined for other information known to be contained in them. The results presented here are clear cut—but they remain a progress report.

RESEARCH on permanent horticultural crops generally requires great patience on the part of the investigators and interested fruit growers. Nowhere is this more so than in determining the effects of rootstocks on fruit trees, where factors such as longevity are of considerable importance. Fourteen years ago, the Department of Agriculture decided to establish a trial of rootstocks for orange trees. Now, in 1944, it is possible to present a few interesting features of the experiment. The final results may not be obtained until another 40 or 50 years have passed.

In 1931, carefully selected seeds of Sweet Orange, (*Citrus sinensis*), Sour Orange (*Citrus Aurantium*) and Citronelle (Syn. Rough Lemon—*C. Limonia*), were planted at Irymple in the Mildura irrigation district. The resulting seedlings were heavily culled and the selected plants transferred in 1932 to a special nursery at Merbein. In 1933, they were budded with selected buds of Washington Navel and Valencia Late oranges. Culling was severe in order to produce as uniform a line of each combination as possible.

Six acres of land on a typical virgin Murray sand ridge on the property of Messrs. Leng Bros., Irymple, was selected as a suitable site for the planting of the trial. Murray sands and closely related soils are the types on which citrus trees grow best, and, apart from small specialized areas, are the only ones on which the planting of citrus under irrigation can be recommended. On this ridge, 30 trees of each stock-scion combination, 180 trees in all, were planted in 1934, suitably arranged in plots with double guard rows so that a fertilizer trial could be combined with the stock trial when the trees reach bearing age.

The experimental area is tended by Messrs. Leng Bros. by agreement with and under the supervision of the Department of Agriculture. Irrigation water is supplied from an underground pipe-line. Tile drains have been put down. Records of growth, yield, quality and other details have been kept continuously, except of recent years when detailed recording has not been possible. From time to time, field days have been held on the grove, the last in 1940, for the presentation of progress reports to citrus growers. Many will have seen reports of these field days in the local papers or in the trade journals.

Tree Size

In the nursery, and until 1937, the largest trees were those on citronelle stock, with those on sour orange stock next, and those on sweet orange stock the smallest. In 1937, however, the trees on sweet orange stock had caught up to those on citronelle stock, and, in 1938, surpassed them, and have since continued to be the largest trees in the experiment. Trees on sour orange stock have remained the smallest. The circumference of the trunk about six inches above the bud union is a good measure of the size of the tree, and Table I. shows the average trunk circumference of Washington Navel trees on each stock from 1934 to 1941. The figures for Valencia Late trees are very similar. Size measurements after 1941 are not available.

Washington navel orange trees in their tenth year.

Left—On sweet orange. Centre—On sour orange. Right—On Citronelle.

TABLE I.—TRUNK CIRCUMFERENCES OF WASHINGTON NAVEL TREES IN CENTIMETRES

(2·5 cms. = 1 inch.)

Year.	Stock.			Difference for Significance.
	Sweet Orange.	Sour Orange.	Citronelle.	
1934 ..	2·35	2·76	3·33	..
1935 ..	3·85	3·66	4·72	0·24
1936 ..	9·71	8·50	10·18	0·38
1937 ..	16·59	14·13	16·30	0·57
1938 ..	23·47	19·53	21·93	0·89
1939 ..	30·53	25·79	28·14	1·08
1940 ..	34·91	28·77	31·46	1·11
1941 ..	40·83	33·21	35·72	1·28

Tree Shape

The rootstocks have had characteristic effects on the growth of the trees, and the rootstock can readily be ascertained from the appearance of the top. Trees on sweet orange stock are well grown, rounded in outline, and wider than they are high. Trees on sour orange stock are smaller and of similar shape, if anything more ball-shaped. Trees on citronelle *appear* to be higher than they are wide, and are more irregular in outline, due to a rather straggly, vigorous top growth. Figures 1 and 2 show typical trees on each stock, photographed in July, 1944.

Health of the Trees

Since 1940, shortage of labour has lowered the standard of the cultural attention which could be given to the grove, and the trees have not made the progress expected of them. None the less they are mostly well-grown and shapely. Some are now declining in health, and a survey made in July this year yielded the information shown in Table II.

TABLE II.—NUMBER OF TREES OUT OF 30 NOT PERFECTLY HEALTHY.

Scion Variety.	Stock.		
	Sweet Orange.	Sour Orange.	Citronelle.
Washington Navel ..	..	6	4
Valencia Late ..	1	9	1

Sweet orange stock carried healthy, uniform trees. One out of every four trees on sour orange stock was declining in health. One out of every twelve on citronelle stock was declining. The high proportion of unthriftiness of the sour orange stock is perhaps due to insufficient irrigation, which has been unavoidable at times. Sour orange is popularly thought to be less drought resistant (and more water-tolerant) than citronelle and sweet orange. Sweet orange appears to be the most reliable stock for the maintenance of tree health so far.

Yield of Fruit

No fruit was allowed to mature on the trees until 1938. In that year there was no important difference in the yields from trees on the various stocks. The yields in later years are shown in Tables III. and IV.

It can be seen that the yield of trees on sweet orange stock is generally better than that of trees on the other stocks. This difference is real, not a chance effect.

The difference between trees on sour orange and citronelle stocks is not so certain, and a study of the detailed records shows the reason. Trees on sweet orange stock are uniformly good throughout the grove, while trees on sour

orange and citronelle stocks are quite variable in their yields and consistently lower than trees on sweet orange stock. At the top of the ridge, trees on citronelle stock outyield trees on sour orange stock. On the lower slopes, trees on sour orange stock outyield trees on citronelle stock. This behaviour is probably a reflection of the soil and moisture conditions in the grove, citronelle evidently preferring the drier conditions at the top, and sour orange the moister conditions at the bottom of the slopes.

TABLE III.—AVERAGE YIELDS PER TREE IN POUNDS OF WASHINGTON NAVEL ORANGE TREES.

Harvest Completed.	Sweet Orange.	Sour Orange.	Citronelle.
July, 1939	76	61	93
,, 1940	206	148	189
,, 1941	47	87	93
,, 1942	139	106	115
,, 1943	228	173	192
,, 1944	312	243	247
Total ..	1,008	818	929

TABLE IV.—AVERAGE YIELD PER TREE IN POUNDS OF VALENCIA LATE ORANGE TREES.

Harvest Completed.	Sweet Orange.	Sour Orange.	Citronelle.
Dec., 1939	41	27	47
,, 1940	206	155	171
,, 1941	10	9	8
,, 1942	182	143	134
,, 1943	66	84	66
Total ..	505	418	426

Quality of Fruit

Shortage of technical staff since the trees began to bear appreciable crops has made the collection of information about quality of fruit difficult. In 1942, it was possible to sample the Washington Navels at approximately fortnightly intervals, and to have the samples analysed. The results showed no differences in the percentage of juice or rag, or in thickness of rind. The figures for acid and sugars are shown in Table V.

TABLE V.—ACIDITY AND BRIX OF WASHINGTON NAVEL ORANGES.

Date of Sampling—	Ccs. N/10 Soda per 10 ccs. of Juice.			Degrees Brix at 17.5°C.		
	Sweet Orange.	Sour Orange.	Citronelle.	Sweet Orange.	Sour Orange.	Citronelle.
March 20..	35·6	32·9	29·6	10·2	10·5	9·2
April 4 ..	28·4	28·5	25·4	9·4	9·7	8·9
April 17 ..	26·5	25·9	22·5	9·3	10·2	9·5
May 1 ..	19·3	21·1	16·9	10·4	10·8	9·7
May 18 ..	18·1	18·0	15·0	10·5	10·9	9·4
May 30 ..	16·1	16·4	14·3	11·0	11·4	10·0
June 15 ..	14·6	15·2	12·3	10·9	11·8	10·3
July 3 ..	12·6	14·0	10·8	10·8	11·8	10·7
July 26 ..	11·5	11·9	9·2	11·7	12·1	10·7

For that particular season, one would say that, based on the citrus maturity standard of 24 ccs. of N/10 soda per 10 ccs. of juice, navels on citronelle stock would be marketable about a fortnight before navels on the other stocks. Actually, however, none of the trees yielded really palatable fruit until after 1st May. The higher acidity of fruits from trees on sweet and sour orange stocks was apparently balanced by their higher sugar content. Fruit from the trees on citronelle stock has been

Valencia Late orange trees in their tenth year.

Left—On sweet orange. Centre—On sour orange. Right—On Citronelle.

The pictures illustrate the progress made by the grove in ten years.

sometimes classed as insipid, probably because of the lower acid content late in the season. Fruit on trees on sour orange stock would be expected to maintain their quality later in the season than other fruit but no exact information is available on this point. At the last sampling date fruit from trees on both sweet and sour orange stocks was still very attractive.

The Future

Up till 1944, all the trees in the trial were given identical dressings of fertilizer and the same cover crop treatment. As the trees have now grown to a fair size and are bearing fruit in reasonable quantity, the second part of the experimental programme has been initiated by the application of different fertilizer treatments to different plots. Cover crop treatment will remain uniform in all plots.

All the trees now receive 8 lb. of sulphate of ammonia each in early spring. Other experiments at Merbein have shown that this rate of application is the best for citrus trees on a light soil. Ten out of the 30 plots receive only this dressing. Twenty out of the 30 receive in addition 12 lb. of superphosphate per tree. Ten out of this twenty receive, in addition to the sulphate of ammonia and superphosphate, 4 lb. of sulphate of potash per tree. The respective quantities of super and sulphate of potash supply approximately equal quantities of phosphorous and potash. These two fertilizers are not expected to increase the yields of the trees; they are included in such large amounts principally in an effort to discover whether they affect fruit quality. Any results of these treatments may not be apparent for many years.

Each plot has six trees in it, all of the one scion variety, but two on each of the three rootstocks. In the Washington Navel plots, the fruit of one of each pair will be picked as soon as it passes the maturity standard. The fruit on the other will be left unpicked until much later in the season. In the Valencia Late crops, the fruit of one tree on a given stock will be picked at the normal time, the fruit on the other will be left as long as it will hold without granulating or otherwise deteriorating.

A close check will be kept on the effect of these practices on yield, quality and financial returns. Unfortunately, this check will not be possible until the Department's staff regains normal numerical strength.

Conclusion

Summarizing the results of the rootstock trial up to the trees' tenth year, the best stock for both Washington Navel and Valencia Late oranges on typical Murray sand soil has been sweet orange. It produced large, shapely, uniform trees, carrying a good crop of fruit, while sour orange and citronelle stocks varied with the soil conditions and produced smaller crops.

Trees on sweet orange stock produced fruit of good quality, marketable very little later than fruit from trees on citronelle stock, certainly of better flavour and carrying well into the late season. This good performance of sweet orange as a stock is noticeable throughout the Mildura district.

No comparison with other stocks at present in the public eye is available in this trial. However, it does suggest that sweet orange is a reliable stock for the average planting.

Acknowledgments

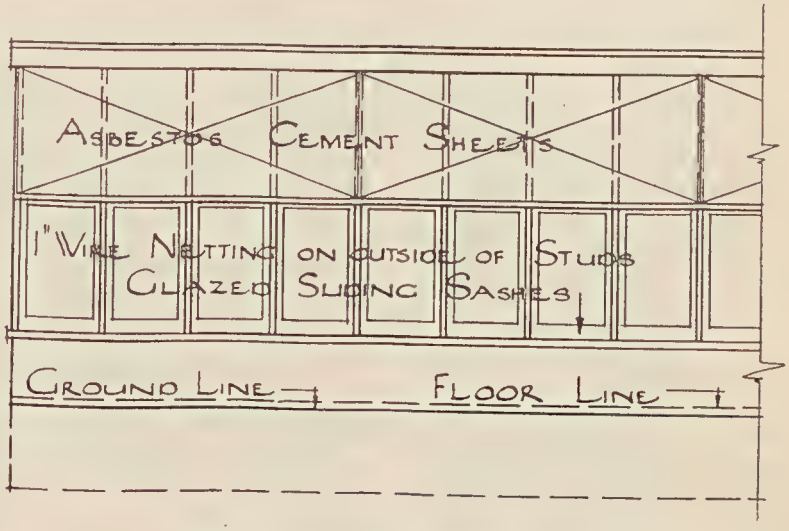
The willing co-operation of Messrs. Leng Bros., and the assistance of other officers of the Horticultural Division of the Department in the conduct of this trial are gratefully acknowledged.

POULTRY BROODER HOUSES

Plans and Specifications

By MARTIN D. HALL, Assistant Poultry Expert

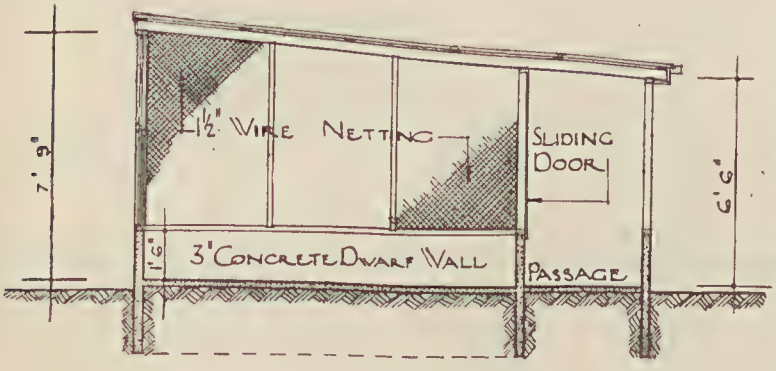
WITH the modern electric systems now in use, the brooding of chickens does not require the same amount of skill and patience needed to work the older types of brooder. The electric brooder, however, works so efficiently that it is possible for the poultry farmer to develop a confidence bordering on indifference. Should this happen, the chickens may not receive the care and attention required.



Front elevation (Type I brooder house).

The hot water circulatory system for brooders is still widely used. A modern addition to this system is the fitting of an electrical device which automatically controls the temperature of the water if the fire in the boiler dies down. Kerosene-heated brooders are still widely used, and many other systems using various types of fuel are giving satisfactory service.

The modern tendency is to build a simple type of brooder house, well-constructed, having concrete floors and fitted with electrically heated brooders. Three types of brooder house suitable for the installation of modern electric brooders are illustrated in the following article.



Sectional partition.

The principal purpose of brooding is to supply warmth to the chickens and also the required amount of fresh air to maintain their health. It is well to remember that the chickens in the brooder house represent the nucleus of the future flock. When old enough, the most suitable birds will be placed in the breeding pens, and ultimate success depends to a great extent on the condition of the chickens when they leave the brooder house. The slightest check received may alter the whole future prospects. Brooding is a most critical period, and nothing must be left to chance. The time and trouble taken in the selection of the best breeding stock may be wasted if the operations of rearing are not properly carried out. Pullets must be reared so that they will be well developed and constitutionally strong on reaching maturity. The necessity for rearing strong, healthy pullets is most important, especially on farms where large numbers of birds are kept.

The brooder house should be light and airy, but free from draughts, with the atmosphere inside the house dry rather than humid, and of a uniform temperature. There should be a regular inflow of fresh air to replace impure air. The atmosphere inside the house is readily contaminated if a large number of chickens is accommodated, due to the exhalation of impure air, the presence of excreta, and in some cases fumes from the heating unit. Impure air retards growth and increases the death rate.

Excessive ventilation however will lower the temperature unduly and cause chilling. This tends to weaken the chicks and increase mortality, while overheating is debilitating and interferes with growth and development.

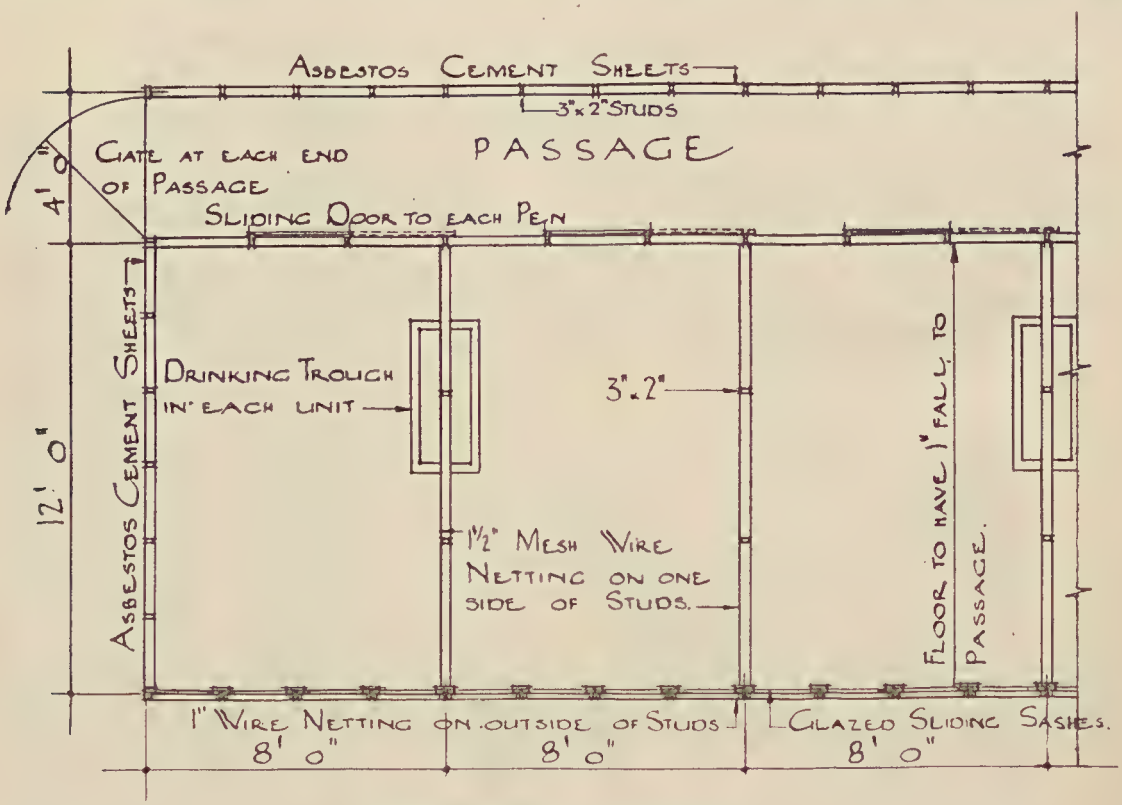
Grass runs for the chicks are of great value, the chickens receiving the benefit of direct sunlight and open air conditions. To obtain the best results from this system, it is important to provide an area with a vigorous growth of pasture and large enough to prevent excessive contamination.

Chickens grow rapidly during the brooding period, and for this reason it is preferable to place a smaller number of birds in the brooder than is often recommended.

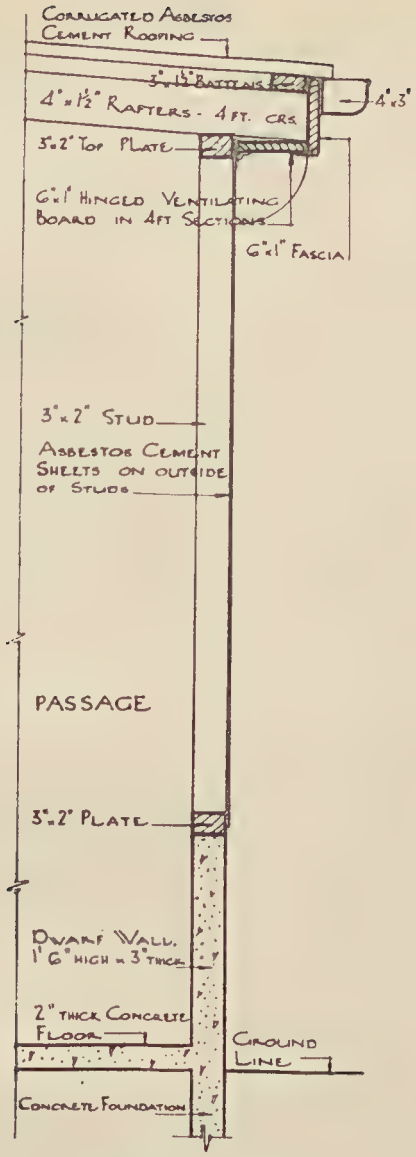
All equipment should be designed so that it may be readily removed from the house to facilitate cleaning. The plans of the three brooder houses illustrated give all the details of construction, size and placement of materials. All materials are stock size and may be obtained at most timber yards.

Site

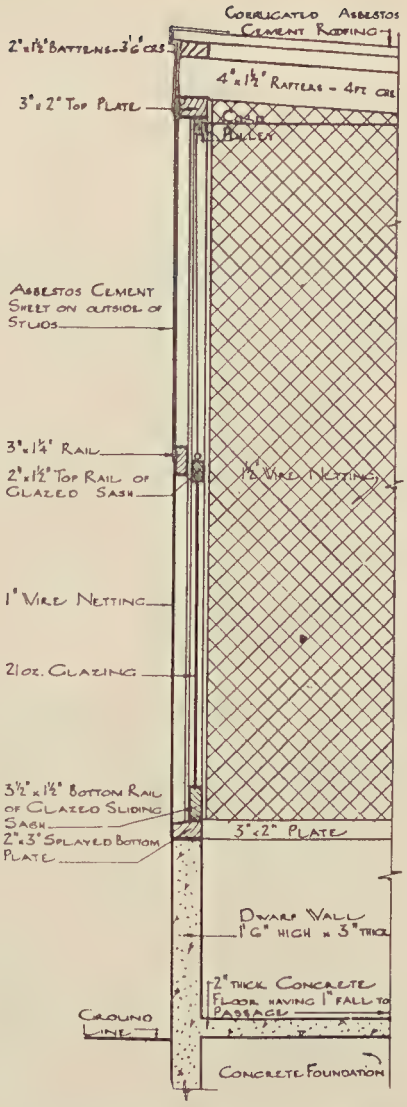
The brooder house should have a northerly aspect, and, if possible, face downhill. This allows for natural drainage away from the building, leaving the grass runs in front well drained and comfortable. The obvious disadvantage of facing the house uphill is that, during wet weather, the surface water drains towards the house, necessitating the erection of a drain or gutter along the front of the house to divert the water. When the building faces downhill, the drainage at the rear is carried away in open gutters placed approximately 3 feet from the rear wall. Protection from wind is desirable, but in providing windbreaks, care must be taken not to block out the direct sunlight from either the brooder house or the runs in front. Low-lying flat land, and heavy clay soils, are not good for a brooder house



Ground plan (Type I brooder house).



Detail Section, back wall (Type I brooder house).


Corrugated Asbestos Cement Roofing
2"x1½" Battens - 3'6" crs
4"x1½" Rafters - 4ft crs
3"x2" Top Plate
Asbestos Cement Sheet on outside of Studs
3"x1¼" Rail
2"x1½" Top Rail of Glazed Sash
1" Wire Netting
1" Wire Netting
21oz. Glazing
3½"x1½" Bottom Rail of Glazed Sliding Sash
2"x3" Splayed Bottom Plate
3"x2" Plate
Dwarf Wall 1'6" high x 3" thick
2" thick Concrete Floor having 1" fall to Passage
Ground Line
Concrete Foundation

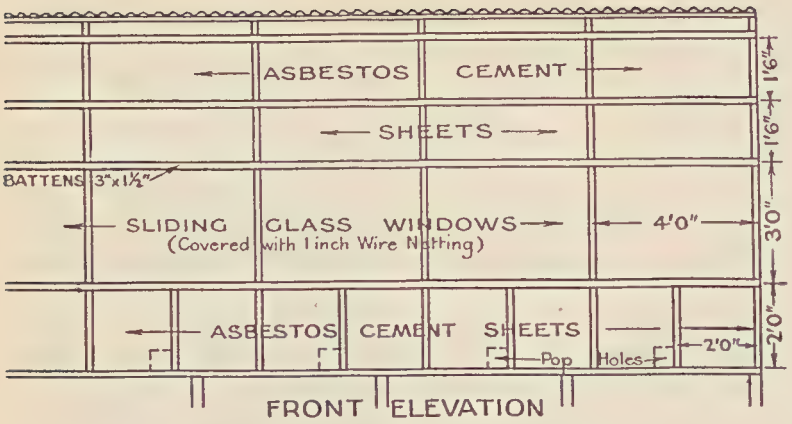
Detail Section of front wall and sectional partition (Type I brooder house).

site as they are hard to drain, whereas light sandy or sandy loam soils with a slope, provide good drainage and healthier conditions for the chickens.

Direct sunlight should be permitted to shine in on the floor of the brooder house. It is a disinfectant, and also a preventative of rickets (poor bone formation). All windows in the front of the brooder house should be movable, so that they can be opened to allow sunlight to shine on the floor. Ordinary window-glass filters out most of the ultra-violet rays so valuable as a rickets-preventing factor. Certain glass substitutes admit portion of this factor, but an open space is cheaper than a glass substitute, and this can be obtained by fitting movable windows.

A northerly aspect provides the maximum amount of sunlight throughout the day, enabling the chickens to be allowed out earlier, and to stay out for a longer period.

There are no standard sizes laid down for brooder houses, and poultry farmers usually build one large enough to provide for their



Front elevation (Type 2 brooder house).

own requirements. The size of each compartment is important. Chickens do better in small groups than in large ones. Most poultry farmers keep them in groups of 100 to 200, but whatever the number, 50 square feet of floor space should be allowed for each 100 chickens.

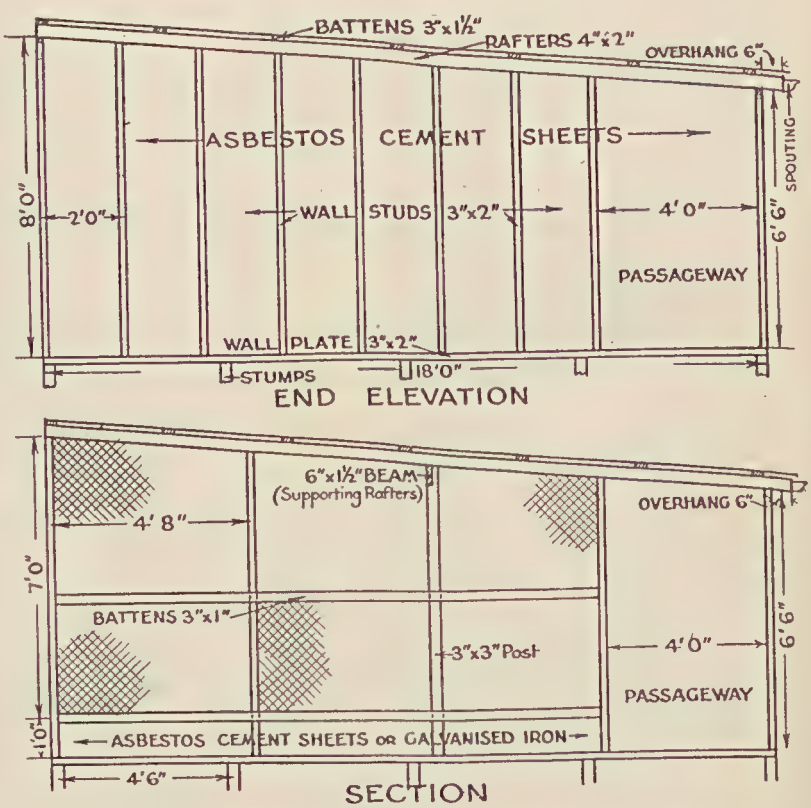
Types of House

Most of the brooder houses throughout Victoria are similar in design, but vary greatly in size.

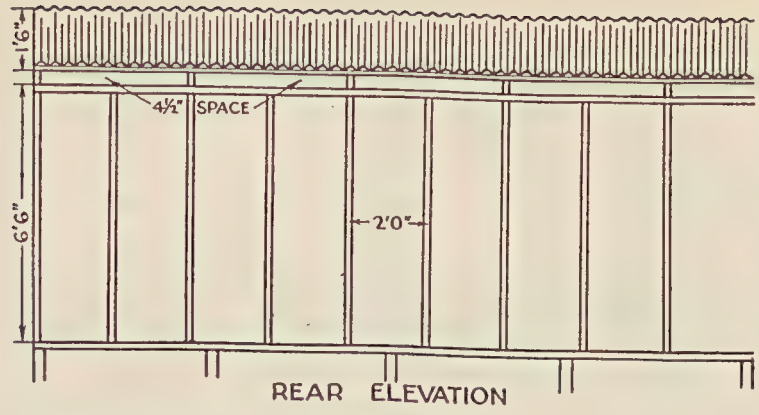
The house with a skillion-type roof is popular, economical to build, and gives satisfactory service. The interior lay-out of most houses is similar, inasmuch as they have a passageway along the back, and the remainder of the floor area is divided into sections. In different brooder houses, these sections vary in size according to the number of chickens it is intended to rear in each section.

The brooder house set out in the plans illustrated as Type 1 is a very practical one. The passage-way is 4 feet wide, and each section measures 12 feet x 8 feet, providing comfortable accommodation for 150 to 200 chickens. Some poultry farmers on large commercial farms may prefer to install larger hover-type electric brooders to accommodate increased numbers of chickens in each compartment. In this event it would be necessary to increase the size of each section.

The concrete foundations are set to a depth of 18 inches below ground level. This makes a serviceable job and is also a prevention against rats. The foundation is 4 inches thick, and continues for 18 inches above the ground level, to form portion of the front, side, and back walls, and also the sectional partitions. Movable windows, measuring 3 feet high, are built in casements set on top of the concrete base, while the remaining space above the windows is covered with asbestos cement sheets or galvanized iron.



End and sectional elevations (Type 2).



REAR ELEVATION

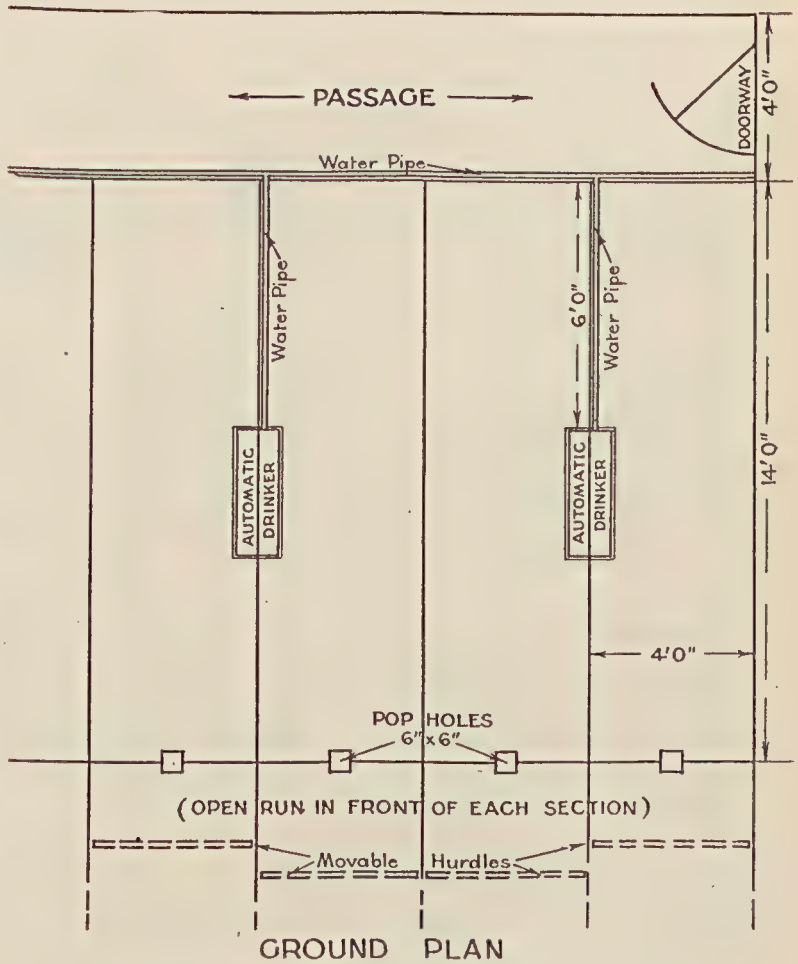
Single-unit electric hover brooders may be fitted in each section, and for the first week the chickens are confined to a limited space near the hover, where they are given food in small hoppers and water in drinking vessels. After the first week, they are allowed to use the whole of the brooder-house compartment, and obtain their food and water from the food hopper and automatic water trough shown on the ground plan (Type 1).

The windows are raised by a cord which is operated from the passage. Various amounts of direct sunlight may, in this way, be allowed to enter the house, as the windows can be raised from an inch to wide open, according to the prevailing weather conditions.

The type of house set out in the plans illustrated as Type 2, is the design used on most commercial poultry farms in Victoria, and is usually heated with the hot-water-pipe-circulatory system. Quite a number of poultry farmers, however, have removed the water pipes and installed single-unit electric hover brooders. Where electric power is not available, the hot-water system is being used, and is giving satisfactory service.

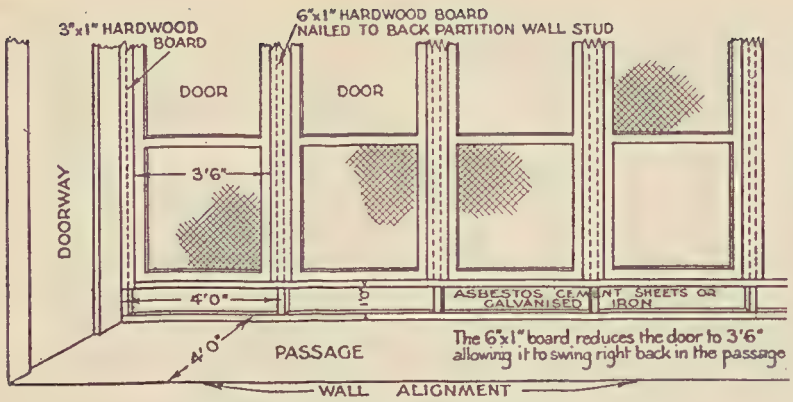
This house is 18 feet deep, and has a 4 feet passage at the rear. The sections are 4 feet wide and provide accommodation for 100 chickens. The hot-water pipes which constitute the hover, are covered with either boards or bags or both. The chickens are confined close to the hover for a few days, and are fed in the space between the hover and the back partition. The feeding and drinking system is similar to that described in plans illustrated in Type 1.

The house set out in the plans illustrated as Type 3, although most unusual, has given satisfactory results, and is economical to build. It is an open-fronted house, measuring 9 feet deep and divided into 8 feet sections, which provides accommodation for 100 to 150 chickens in each compartment. A single unit electric



GROUND PLAN

Type 2 house.



VIEW OF REAR WALL COMPARTMENTS

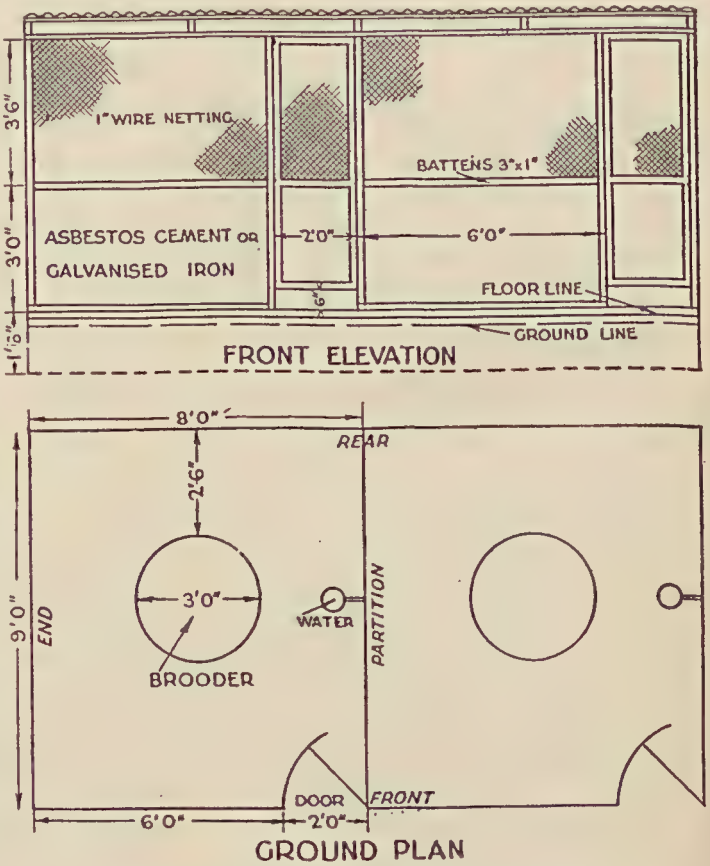
Rear wall compartments (Type 2 brooder house).

hover brooder is used in each section, and placed 2 feet away from the rear wall. The front wall consists of a solid section built 3 feet up from the ground, while the 3 ft. 6 in. space to the roof is covered with 1 inch mesh wire netting. A 2 ft. door completes the front which has no further protection other than the 2 ft. overhang of the roof. In practice this house has proved to be very satisfactory, provided the brooder contains the required heat, for the chickens receive a perfect combination of heat, fresh air, and direct sunlight. The fresh invigorating atmosphere of this type of house, with the warmth of the brooder and the direct sunlight provide as near to natural conditions as it is possible to give chickens being artificially reared under intensive conditions. This type of brooder house should be used only where there is ample protection from cold winds and rain.

The ventilation space at the top of the back wall is controlled by a hinged board, and the house is constructed on warm, snug lines. Each section is entered by a door in front. The chickens are kept close to the brooder by a hurdle approximately 12 inches high, which forms a circle around the hover. The birds are given food and water inside this hurdle. The space is increased a little each day for seven days, after which the hurdle is removed. The chickens then use the large food hoppers and the automatic water vessels.

The floors are of concrete 2 inches thick, and are covered with 3 to 4 inches of rice hulls. All brooder houses should be made rat-proof by placing concrete, bricks, sheet iron or fine wire netting to a depth of 18 inches below the ground level.

The conduit for the electric current is fastened to the centre roof batten, where a power plug is fitted to convey the power to the electric hover. It has been found from practical experience that to do well, the chickens must be moved from these brooder houses when five weeks old, and transferred to chicken houses on free range. The open nature of this type of brooder house tends to harden the chickens off much quicker than the enclosed type. After being transferred to the chicken houses,



Front elevation and plan (Type 3 brooder house).

they should be confined there for three or four days, to become accustomed to their own particular house so that they will return there each night to roost.

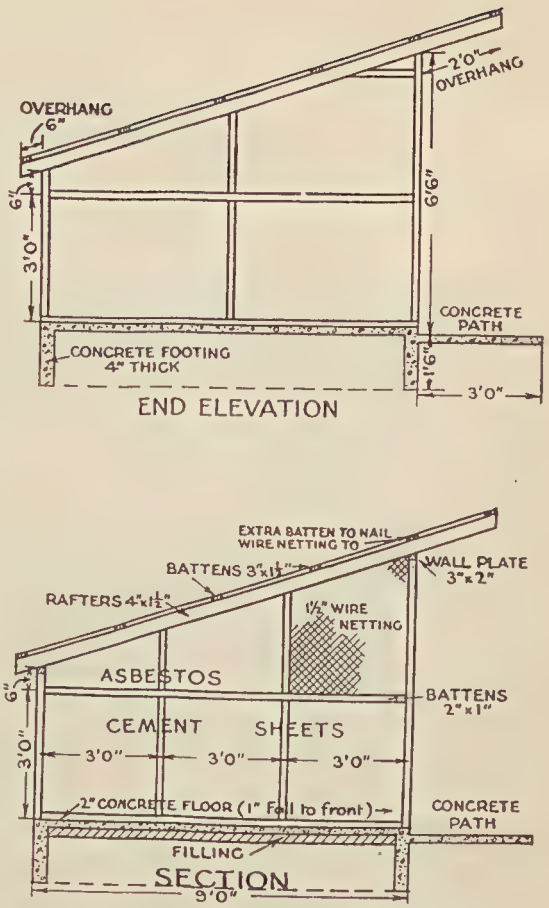
An Automatic Water Supply for the Brooder House

The automatic drinking-water system, the details of which are given below, was used at the State Research Farm, Werribee, for many years, and gave satisfactory results.

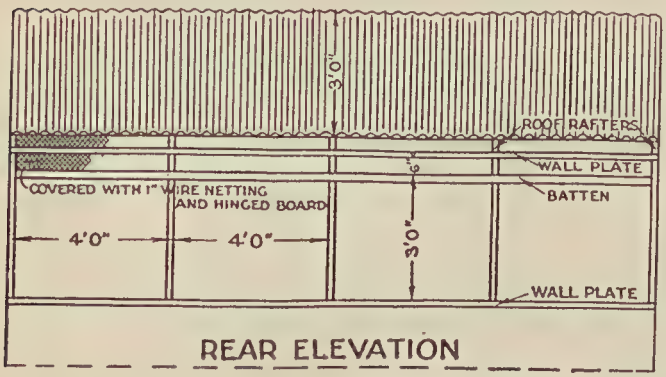
The trough is made of galvanized iron, and measures 1 foot long by 3 inches wide by 2 inches deep. The ends are $1\frac{1}{2}$ inches higher than the sides, and are brought to a point. A slot is placed in the top at each end, so that a centre partition may be fitted into it. The ends of this partition also fit into slots made in the wooden uprights, described below, so as to hold the trough in place. At one end of the trough a pin is soldered, which fits into the wooden upright, and to the other end the water pipe is attached and secured with locknuts, together with a leather washer.

The trough is supported between two wooden uprights each $7\frac{1}{2}$ inches high, 3 inches wide, and $\frac{7}{8}$ inches thick. The uprights are fixed to a cross-piece $12\frac{1}{2}$ inches long, 3 inches wide, and $\frac{7}{8}$ inches thick. The cross-piece is placed $2\frac{3}{8}$ inches above the ground level, i.e., $\frac{3}{4}$ inch below the bottom of the trough.

The water is supplied through a cistern with a ball tap along a $\frac{3}{4}$ inch pipe below the ground, then through a $\frac{3}{4}$ inch pipe below the ground, and through a $\frac{3}{8}$ inch pipe to the trough. The pipe enters the trough $\frac{1}{2}$ inch up from the bottom, and if the cistern is placed at the correct level, the water automatically reaches a height just a little below the top of the trough. In the early stages, a temporary step is provided to enable the chickens to reach the water.



End and sectional elevations (Type 3 house).



The trough is placed about 1 foot away from the hot-water pipes, and fixed to the brooder-house partition. This partition is shown in the plan as extending only just across the pipes, but when a large number of chickens is to be accommodated it is completed by placing a temporary hurdle right across the brooder house. The drinking trough then serves two lots of chickens. When the trough is to be cleaned, the centre partition is removed, the inside locknut loosened and the trough turned over on its side.

SHEEP DIPPING

Requirements of the Act

Compiled by the Veterinary Staff

THE presence of ticks and lice on sheep is a serious cause of loss to wool-growers. These parasites set up such irritation that the sheep scratch and bite at their wool or rub themselves against any convenient hard object such as a log or fence. In this way the fleece is damaged and its value lowered. The damage caused varies with the degree of infestation and may range from 1d. per lb. to as much as 6d. per lb.

This danger is recognized by the majority of sheep-owners, and steps are taken to rid their sheep of these parasites by dipping their sheep each year after shearing. There are, however, some owners who, either through carelessness or lack of proper facilities, neglect this precaution, with the result that their sheep become so badly infested that they are a source of danger to other flocks.

Apparently there is some confusion among sheep owners as to the life history of these parasites, and the means by which they are spread from one animal or flock to another. The sheep tick or ked is not a true tick, it belongs to a family of two-winged flies. Ticks live in the wool and frequently on hot days they come to the surface, and may be seen on the sheep's back and sides basking in the sun. They feed by inserting their snout into a skin pore, where a wound is made by the rough edge of the snout, and the blood sucked up. The mature female lays an egg which contains a fully developed larva. At first the egg is white, but within a few days it shrivels slightly and turns a dark-brown colour. It remains in this pupating stage for from 19 to 25 days, when a fully formed tick emerges. This tick reaches maturity in about four days, and on about the fourteenth day the female lays eggs and so the life cycle is complete.

A great deal of discussion has centred around the length of time ticks can remain alive on fences or in sheds away from the sheep, and many experiments have been carried out in order to throw light on this question. In many European and American experiments, all ticks died within four days after being parted from the sheep, but different results were obtained in experiments carried out by Drs. Sweet and Seddon at the Melbourne Veterinary School. In these tests, 151 ticks were collected and kept under varying conditions. Two, which had been kept on soil in a cellar, died on the 11th day; all the remainder died previously, the majority within three days. In a later experiment carried out by Dr. Hill, one lived for eighteen days on a piece of wood covered with bark and kept in sheep-pen sweepings. As a result of these experiments we can say definitely that three weeks is the maximum period of existence apart from a live sheep, and that while the usual method of spread is from one live sheep to another, sheep may become infested if placed in sheds or yards where infested sheep have recently been kept.

Push the heads under gently.

The sheep louse (*Trichodectes*) is a biting variety. It is very small—about one-thirtieth of an inch long, and owing to its greyish-pink colour, it is extremely difficult to see against the pink skin of a healthy sheep. Sheep lice are found usually about the front of the shoulder blade or on the neck. In searching for them do not look on the wool fibre; eggs only will be found there. Open the wool wide with the direct sunlight on it, and the louse will be seen right on the skin. It is extremely active, and is endowed with marvellous fecundity and tenacity of life. It never leaves its host unless it can transfer to a fresh victim in contact. This it does with great rapidity, and one infested sheep will thus infest a whole flock in a very short period.

The females lay eggs which hatch in five to seven days, and within about fourteen days of hatching the louse is fully developed, and the female lays enormous numbers of eggs. Thus the life cycle is complete in about eighteen days. The louse lives on the skin, and when feeding, bites through the skin, causing intolerable irritation. The louse causes much more damage to the fleece than the tick does, and also is much more difficult to destroy.

In order to protect careful owners of sheep the Government some years ago passed a Sheep Dipping Act. Under this Act, every sheep-owner must shear all his sheep each year within the prescribed time, and must dip all his sheep and lambs immediately after shearing and direct from the shearing board. If it is not convenient to dip direct from the board the Act provides that the sheep must be kept in a securely fenced paddock and dipped within 60 days after shearing.

Amendments to the Sheep Dipping Act in 1942 provide for the use of power spray dips of a type approved by the Minister of Agriculture and also allow fat sheep or lambs, which have been placed and kept in a securely fenced paddock, to be removed direct to any abattoirs, freezing works or meat preserving works for the purpose of immediate slaughter, without having first been dipped, provided that the sheep or lambs are free from ticks and lice, and that the removal takes place within 60 days after the owner's sheep have been shorn. It will be noted that such fat sheep must go direct to the place of slaughter and cannot pass through the sale yards.

Within 30 days of dipping a return on the prescribed form, available from the Department of Agriculture, must be forwarded to the Chief Veterinary Inspector. Penalties are provided for breaches of these sections of the Act, and many sheep-owners have been prosecuted and fined for infringements of the Act. Penalties are provided also for persons who travel on public roads or highways or expose in sale-yards sheep infested with ticks or lice. If a person in charge of travelling sheep finds any animal carrying ticks or lice and unable to travel he must take them in a conveyance or leave them in the care of some person. They must not be left upon any road or the land of any sheep-owner. Such sheep must not be abandoned without being destroyed, i.e., killed, and either buried, burned, or boiled down. During the past few years the administration of the Act has been carried out more rigorously, and it is the intention of the Department to be even more strict in future.

Some owners and stock agents are under the impression that fat sheep forwarded for sale in fat pens need not be dipped before despatch. This belief is quite incorrect. Many graziers buy sheep in fat pens as forward stores or for topping off, and should these sheep be infested with tick or lice the parasites may be communicated by them to clean flocks. Therefore if infested sheep are found in fat pens the owners are just as liable to prosecution as those owners who offer their sheep in store pens.

Mature female sheep tick (enlarged).
[After Mönnig.

Fortunately, flocks may be kept free from these parasites without great difficulty, for careful attention to dipping will completely rid the sheep of ticks and lice. In the Act, "dip" or "dipped" means that the animals must be thoroughly immersed in some effective and approved preparation for destroying vermin.

Refusal or neglect to shear sheep and lambs annually (except lambs to be kept as hoggets) constitutes a breach of the Act.

An inspector may require an owner to muster his sheep and lambs for the purpose of inspection, but such muster cannot be ordered between 1st April and 13th September. An owner may be ordered to dip within fourteen days a flock in which sheep have been found carrying ticks or lice. Failure to comply with such an order renders the owner liable to a penalty of £10. If this order is not complied with within seven days of a conviction, the owner is liable to a further penalty of from £5 to £20 and so on for each succeeding conviction.

It is desirable that sheep-owners should construct a dip on their own properties. Driving to and from a public dip or a neighbour's dip is good neither for the sheep nor for the dipping.

If a powder dip is being used, mixing is a most important matter. Measure accurately the quantities of powder and water and see that both are properly combined. The time devoted to mixing will be well repaid. Never guess the contents of a bath. On no account put dry powder into the dip. It is not advisable to use hard water with liquid dips.

The Act does not prescribe what dip shall be used; all that it asks is that the dip shall be effective, and the owner is allowed a free choice of the many proprietary dips on the market; or he may even prepare his own dipping mixture. If sheep are found infested with ticks or lice, the fact that they have been dipped does not relieve the owner of responsibility.

Proprietary dips at present on the market may be divided into two main classes—those which destroy parasites in the process of feeding and are known as poison dips, and those which destroy parasites by coming in contact with the external surface and are known as contact dips. Some makers have prepared a combination of these two main classes in varying proportions. Most of these dips are undoubtedly efficient for the purpose for which they are sold, although the value of some is doubtful. The active ingredient of poison dips is almost invariably arsenic in one form or another, while that of contact dips is cresylic acid or some other coal tar derivative. These dips vary considerably in their lasting properties on the sheep's skin. This is important as the practical value of dipping depends not merely in killing insects alive at the time of dipping, but on the destruction of those parasites which hatch out subsequent to dipping. Those dips which last the longest in the fleece therefore, are the most desirable. One criterion for guidance is their relative solubility. If a dip is readily soluble, it is probably wanting in lasting effects; therefore sheep-owners will be well advised to use dips which mix slowly in preference to those which dissolve quickly.

Sheep louse. (enlarged).

The essential points of the operation of dipping are absolute care and thoroughness. A clean muster is essential. Any sheep or lambs left over at dipping will carry the parasites and will reinfest the dipped sheep when the protective effects of the dip are lost—actually within a few weeks.

Stir the dip thoroughly before putting the sheep into it, and and keep it stirred while dipping is in progress. Do not put overheated sheep into the dip. Care must be taken to thoroughly saturate the animal to the very skin. Check the sheep when swimming through by gently pushing them back once or twice; this opens the fleece, and helps the dip to penetrate. Quickly push their heads under twice with a crutch, but do not hold them under. Drain the sheep thoroughly before allowing them on to pasture. Dry in the shade if possible; drying in the sun sometimes causes scalding, as will also heavy rain. It should be borne in mind that unfavorable conditions, such as heavy rain soon after the operation, may wash out much of the dip, and thus militate against complete success.

In the case of sheep which are badly infested with lice, it is advisable to re-dip the sheep within fourteen days in order to destroy lice which have hatched out of the eggs after dipping, and which have not been destroyed by the dip, and therefore remain in the fleece. If longer periods are allowed, the female will have become sufficiently mature to have laid eggs and thus render yet another dipping necessary.

INFECTIOUS LARYNGOTRACHEITIS

A Disease of Poultry

By HAROLD E. ALBISTON, D.V.Sc.,
Director, Veterinary Research Institute, University of Melbourne

LARYNGOTRACHEITIS is a contagious disease of fowls which is becoming increasingly important in the poultry industry of Victoria. As its name implies, the disease affects the air passages, and all gradations, from an acute and relatively fatal infection, to a mild transient disease with an insignificant mortality rate may be seen.

The cause of the disease is a filter-passing virus, and, as far as is known, it is confined to fowls and is not transmissible to other domestic poultry, or wild birds.

An advanced case of laryngotracheitis—Attitude during expiration.
[After *Beach and Freeborn* Univ. of Calif.

In its acute form, the most pronounced symptom is extreme respiratory distress. The bird elevates the head, extends the neck, and opens the mouth in an attempt to breathe. Not infrequently, fits of coughing and sneezing may be exhibited, with the expectoration of blood-stained mucus from the windpipe. Sometimes a watery discharge from the eyes and nostrils appears, and birds with swollen eyes are common in an infected flock. If death does not occur, the material in the windpipe, which at first consists of mucus containing varying amounts of blood, rapidly becomes caseous or cheesy. The windpipe may become completely blocked, and the resulting obstruction to the passage of air causes the sudden death of the bird through suffocation. Post-mortem examination of a typical acute case shows that the lesions are confined to the upper respiratory tract. The mucous lining of the windpipe shows inflammatory changes, the larynx may be swollen,

The same fowl as pictured above—Attitude during inspiration.
[After *Beach and Freeborn*, Univ. of Calif.

and either mucus or cheesy and blood-stained material is found in the windpipe even as far down as the bronchial tubes.

The symptoms and lesions of laryngotracheitis vary greatly in different birds and in different flocks. All grades of infection may be seen from the acute form described above to the form where, apart from some slight reddening of the mucous membrane lining the larynx and a slight excess of mucus, no abnormality is found at post-mortem, and the affected bird reveals little or no evidence of ill-health. Sometimes the only indication of the presence of the disease is given by an occasional sudden death in an apparently healthy flock of birds. Post-mortem examination reveals a plug of yellowish-white cheesy material wedged in the entrance to the larynx, causing asphyxia. Occasionally birds in such a flock may show some mouth breathing, and if carefully inspected, especially at night, they may exhibit an abnormal incidence of coughing and sneezing. The condition popularly called "roup" by the poultry farmer is in some instances due to the virus of laryngotracheitis.

Control and Prevention

Poultry farmers should avoid the introduction into their flock of birds from outside sources. The disease has appeared on a number of poultry farms in Victoria following the purchase of birds from an infected property. In districts in which laryngotracheitis is prevalent, ordinary hygienic and sanitary precautions are often ineffective as a preventive measure, and the disease may appear although no direct contact can be traced. Recently a vaccine has been made available by the Commonwealth Serum Laboratories, Melbourne, for the protection of fowls against laryngotracheitis. This vaccine has no protective action against other respiratory diseases of poultry, and a definite diagnosis is therefore necessary before its use will be permitted. It is a living vaccine, which is inoculated on the surface of the mucous membrane of the cloaca or vent, where it produces a mild and transient inflammatory reaction. When this local infection subsides, the fowl is protected against the disease. Poultry farmers who have obtained the consent of the Chief Veterinary Inspector to use laryngotracheitis vaccine should make arrangements for a demonstration of the correct method of inoculation.

Vaccination against laryngotracheitis is recommended—

1. To prevent the spread of the disease through a flock after it has appeared in one pen, the remainder of the flock is treated as soon as possible after the appearance of the disease.
2. To protect young birds on properties in which an outbreak has occurred in the past, and where survivors, and therefore potential "carriers" of the disease, still remain.
3. To protect healthy flocks in districts with a heavy concentration of poultry farms in which the disease is prevalent.
4. To protect stud birds, introduced from a clean to an infected property.

Once the disease has appeared, medicinal treatment is quite ineffective, and, apart from the removal of the cheesy material from the opening of the windpipe, which may be followed by quick relief and recovery, no treatment of individual birds can be recommended.

Preventive Vaccination

Any poultry farmer desirous of vaccinating his birds against this disease must apply to the Chief Veterinary Inspector, Department of Agriculture, Melbourne, for a permit to obtain the required amount of vaccine. The vaccine is effective for three days only from the time it leaves the Commonwealth Serum Laboratories, and each bottle of vaccine must be used on the day it is opened. It is put up in bottles containing 100 doses in each. As this is a live vaccine, it should be handled with care, and should not be spilled in the poultry yard. Any unused vaccine, and the empty bottles, should be placed in water in a suitable receptacle, brought to the boil, and boiled for at least ten minutes.

Special Notice

As Infectious Laryngotracheitis is a notifiable disease under the Stock Diseases Act, it is compulsory for poultry owners to report immediately to the Chief Veterinary Inspector or local Stock Inspector any outbreak of this disease in their poultry. Under Regulation 41 of the Stock Diseases Act no vaccine can be supplied or used on any stock without the consent of the Chief Inspector of Stock.

Live Stock Notes

Compiled by
A. C. T. HEWITT, M.Agr.Sc.,
Live Stock Science Officer

Bulk Wheat

WITH the heavy demand for feed wheat, the Australian Wheat Board is finding it very difficult to satisfy all requirements. Most of the bagged wheat held in Victoria has been reserved for seed purposes, and although bagged wheat is being imported from Western Australia and bulk wheat is being bagged at Dunolly and Murtoa, delivery of bagged wheat is already over twelve weeks behind receipt of orders by the Board. This is due entirely to transport difficulties.

The position in regard to bulk wheat is somewhat better, but also on account of transport problems orders for delivery are already more than two weeks in arrears. Stock-feeders are realizing that delivery of bulk wheat can be effected more promptly than bagged wheat, and as a result are ordering more of it.

Bulk wheat is offered in special bulk wheat trucks holding 18 to 19 tons of wheat or approximately 750 bushels at 3s. 3¾d. per bushel delivered to the feeder's nearest railway station, or on a Williamstown basis, whichever is the cheaper.

The order should be submitted to the Australian Wheat Board, 515 Collins-street, Melbourne together with a *pro forma* payment of £120. The wheat is weighed at the loading depot and any adjustments between the actual cost of the wheat and the *pro forma* payments are made by the Board shortly after delivery. All bulk trucks are covered with tarpaulins.

Many stock-owners have been reluctant to buy bulk wheat on account of the problems of carting it on to their properties. These problems however, have been overcome by many farmers and particulars of the methods adopted by several, including Messrs. Wm. Peters, Heathmont, and J. E. Shelton, Somerville, have been collected by the Department's Pig Expert, Mr. L. A. Downey, and are summarized here for the information of others.

To unload a truck efficiently it requires at least four men, two motor trucks, one bagholder, sufficient bags depending upon the bin space on the farm, two four-gallon tins or buckets and a broom to sweep up the bottom of the truck.

At the commencement one motor truck is backed up to the rail truck, and the bag-holder is placed in it. Wheat is scooped up in the buckets by two men who fill the bags. The bags are filled so that they can be tied (not sewn) by the third man who also loads the truck. When the motor truck is loaded the third man delivers and unloads it while the fourth man backs his motor truck in and the process is repeated. When the doorway of the rail truck is cleared, the bag-holder is placed within the rail truck.

It takes at least 6 hours to unload an 18 ton truck in this manner, and when done carefully there is no waste. Four-gallon buckets are quite convenient for men to handle, but where boys or women assist, two-gallon buckets are used and an extra labour unit is considered necessary to unload the truck within the time specified.

By a little co-operation between farmers, it has been possible to obtain teams to unload most trucks efficiently. As bagged wheat has to be carted, the extra cost of taking delivery of bulk wheat is less than one penny per bushel.

Dairy Cows

The Commonwealth subsidy and the completion of arrangements with Great Britain to buy all the surplus dairy products until 30th June, 1948, should assure the stability of the dairying industry for some considerable time. As a result it would be expected that dairy farmers would be building up their herds to reap the full benefits to be gained. However, statistics indicate that dairy cows and heifers, particularly dairy cows, are still being sold for slaughter in greater numbers than normal, with the result that the number of cows is declining. At least one heifer calf should be reared for every six cows in the herd, but unfortunately this number of heifers is not being reared because of the abnormal culling which is taking place.

Certain replacements are unavoidable and in this regard the following information collected at the State Research Farm, Werribee, from 1928-29 to 1938-39 is given for the guidance of dairy farmers. Without allowing for any culling on the grounds of production sixteen out of every hundred dairy cows had to be replaced each year because of old age, disease, deaths, &c. It was the policy to rear all heifer calves, and although forty-seven heifer calves (including premature births) were born for every hundred cows maintained, only thirty-one of these were retained and reared to maturity (first calving). Of this number sixteen were required to replace unavoidable losses, and fifteen for improving the herd. If this had been a commercial herd where improvement was a secondary consideration only fifteen heifers would have been available for sale to other farmers. During the period the calf drop in this herd was 97½ per cent., which is considerably above the average, and yet the number of surplus heifers was barely equal to the number necessary for essential replacements.

Unless dairy cows are to be retained after they have become unprofitable through old age or disease it will be necessary to rear many more heifers than is being done at present. It costs less to rear a heifer than to maintain an unproductive cow which should be culled as soon as she has outlived her productive life.

This is How the Bacon Trade Views a Pig

After consideration of carcass weight and proportions and quality of fat and lean, the bacon trade values a pig on the relative weights of its hams, middles and shoulders.

The picture on the right shows the cured weights, wholesale prices per pound and total values of the hams, middles and shoulders of a typical bacon pig.

The carcass weight of the pig illustrated would be approximately 160 lb. and the live weight approximately 230 lb.

Veterinary Notes

It is generally accepted that bloat in cattle is a constant danger to stock in good seasons with lush pastures or in irrigated areas, but bloat also may occur when cattle are fed on surplus quantities of root crops, such as mangels, parsnips, carrots, turnips, potatoes, &c., which ferment readily. Vegetable waste such as cauliflower and cabbage leaves when used as substitute foods, may cause trouble and sometimes death if fed carelessly or to excess.

Bloat may be brought about by choking from the lodgment of root crops such as carrots, turnips and potatoes, in the throat, such blockage preventing eructation of stomach gases brought about by the consumption of fermenting foodstuffs. Gases lodged in the rumen or first stomach of cattle bring about defective secretions of the necessary normal juices and lack of tone in the stomach walls, which conditions are conducive to food stagnation with subsequent excessive fermentation.

Cattle also are more liable to engorge themselves with unsuitable foodstuffs when they are hungry or underfed.

Prevention should be aimed at in all cases, but when cattle have become bloated immediate relief can be given by the use of the trocar and cannula, which allow the imprisoned gases to escape. Full details are set out in the pamphlet "Bloat in Cattle", obtainable free on application to this Department.

Unfortunately on account of the drought few, if any of these fodders are available at the present time.

[W. D. Shew, G.M.V.C., B.V.Sc.,
Senior Veterinary Officer.]

Bees

The manufacture of beehives and fittings during the past two years has been hampered by the lack of suitable timber, as the timber most suitable for this purpose is required for war uses. In an attempt to satisfy urgent demands, manufacturers have been forced to use some of the native hardwoods with varying results. In the meantime, many hives are lying idle throughout the State as a result of the heavy losses of bees due to the drought. In many cases no attempt has been made to protect these hives from the weather, nor combs from destruction by the larvæ of the wax moth.

The difficulty of securing new material has created a brisk demand for second-hand factory-made hives and fittings. Those owning such material, and with no definite plans for the near future, could dispose of it to others still actively engaged in the industry, to their own advantage and to assist in the production of a valuable food.

Empty hives required for further use when seasonal conditions improve should be placed under cover, and the combs examined frequently for signs of wax moth larvæ. Most bee-keepers are familiar with the appearance of combs attacked by this pest. In the early stages, a light silken web may be noticed between the combs. A closer examination will disclose a tunnel of the same material passing through the cells of the comb and containing the larvæ. The caterpillars resemble the larvæ of the codling moth, but are darker in colour. Combs attacked in the spring and summer months are rapidly destroyed, three to four weeks being sufficient to reduce a set of combs to a tangled mass of web and excreta.

To protect combs attacked by the wax moth, fumigation is necessary to destroy the larvæ. Sulphur could be used, in place of some of the more popular fumigants of pre-war days, such as carbon bisulphide or a mixture of carbon tetrachloride and ethylene dichloride. Ideal conditions for the fumigation of combs would be an airtight room with racks to hold the frames, but, failing that, a more simple and practicable method would have to be adopted, and the following is suggested. Clear a space of ground large enough to accommodate an empty hive body; make a depression in the centre to hold a piece of flat tin or iron pan for the fumigant; put the empty hive body in position, then place some burning coals on the tin and cover with a quarter of a pound of sulphur; tier up half a dozen hive bodies containing the combs to be treated above the one enclosing the fumigant; place two or three sacks on the top to prevent escape of the fumes. It will be necessary to see that the hive bodies are fitted squarely on one another and reasonably close. The fumes will destroy the larvæ, but not the eggs of the moth, and a close watch will have to be kept in all combs for evidence of further damage during the summer months. Combs that have been slightly damaged will be quickly repaired by the bees, but those badly affected should be rendered for wax, or destroyed by fire, together with all refuse from affected combs.

When procurable, a fumigant that will destroy both eggs and larvæ can be made by mixing one part of carbon tetrachloride with three parts of ethylene dichloride. This mixture will produce a gas heavier than air, and should be placed above the combs in the same manner as carbon bisulphide and not underneath as in the case of sulphur.

[J. W. Thomlinson, Apiary Inspector.]

The Preservation of Hen Eggs

The preservation of eggs for household use during periods of scarcity is a sound precaution.

On a large commercial scale, cool storage is the best and most popular way of keeping eggs during long storage, but for the family or home use a supply of eggs can be carried from late spring or early summer, when they can be readily obtained, for use during the lean autumn and winter months.

For best results, it is necessary to have fresh eggs, clean from the nest, and to use a reliable and well-tried preservative. Store the eggs in a cool place; the lower the temperature the better. If a preservative solution is used, the preparation should be quite cold beforehand. The eggs should be completely immersed, and not taken out of the solution until required for use.

If eggs are slightly soiled they may be carefully wiped with a clean cloth slightly moistened with clean water. A new sterilized piece of cloth and clean water should be used for approximately every two dozen eggs.

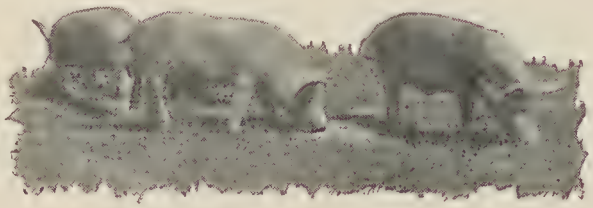
Before they are preserved, the eggs should be carefully examined, and those with cracks, flaws or rough or thin shells should be rejected. Broken eggs will cause other eggs in the preserving container to deteriorate, while thin shelled eggs because of their porous nature will not keep well.

The testing of eggs for quality is done by candling (the examination of the egg shell and its contents in front of a strong ray of light.) The quality of the egg is assessed when it is held before the light, and the method is extremely accurate when performed by experts. Householders could easily make a simple candling device by enclosing an electric globe in a suitable cardboard or wooden box of small size, with a hole in front, somewhat smaller than an egg. In a darkened room, the egg is placed against the hole and turned about, in order to examine various parts of its contents. The size of air-space can be seen at the large end of the egg, and when the egg is new-laid this air-space is approximately the size of a threepenny piece. The yolk of a fresh egg is held in the centre of the egg, and on candling appears translucent or is barely visible. When the egg is stale, the yolk is apt to fall within the egg. The chief points to be noted when candling are; texture and the thickness of shell, size of air-space, condition of yolk, condition of white and presence of internal blemishes, such as blood spots, &c. It is comparatively easy to detect small cracks, foreign bodies and air-space, but the finer differences of internal quality can be judged only by a highly-skilled worker.

On no account should eggs be placed in water and washed, as this allows harmful organisms to penetrate the shell, and the keeping quality will be affected. If eggs are purchased from a commercial poultry farm, care should be taken to see that they are clean, and that they have not been passed through an egg-washing machine. All the evidence of the experiments recently made are in agreement that cleaning machines have harmful effects upon the keeping quality of eggs, simply because the machines are reservoirs of infection.

Eggs from birds fed on good foods and kept under ideal conditions are generally the most suitable for preserving.

[H. F. Clinton, Poultry Expert.]



The Flower Garden

Plants for Dry Conditions

By J. L. PROVAN, B.Agr.Sc.,
Principal, School of Horticulture, Burnley Gardens

UNLESS more than the usual amount of summer rainfall occurs this season, many gardens may find it difficult to survive with restricted water supply. Gardeners can maintain a fairly bright display of flowers in spite of dry conditions by choosing those plants which will tolerate a fairly dry soil. Of course if water supplies are restricted the plants themselves do not grow so large or so quickly as with adequate moisture conditions, and usually the flowers are smaller.

The total effect is frequently a more spectacular one as a floral display, because the number of flowers appears to increase as the amount of foliage decreases, thereby giving a brighter effect. This is particularly noticeable with some plants, and, in fact, such plants should be grown with a restricted water supply to obtain this result. Of course, small quantities of water must be applied regularly in order to get the young seedlings established, and also, in the case where seed is sown directly into the bed where the plants are to flower, in order to get a satisfactory germination.

Where water is scarce do not use it for light sprinklings, but endeavour to conserve the supplies by allowing it to soak into the ground with as little run-off as possible, and make the interval between waterings as long as possible.

If plants are to survive under low water-supply conditions, it is better to encourage a hardy type of growth from the seedling stage onwards. Do not over-stimulate the plants with nitrogenous manures, but rather, grow them under what is known as hard conditions and so obtain short, stocky plants. Some plants suitable for growing under fairly dry conditions are as follow:—

Marigolds

Both the African marigold and the French marigold grow well under dry conditions. The former should be planted about 18 inches apart and the latter from 10 in. to 2 ft. apart, depending on whether dwarf types or the tall branching types are grown. The dwarf types of marigold, such as *Russet and Gold* and *Legion of Honour,* may be planted towards the front of the flower border as they attain a height of about 12 to 15 inches only. On the other hand, the tall tree marigolds grow to a height of about 4 feet, and therefore should be planted towards the back of the border. The latter are useful for the supply of winter flowers, if grown in a warm situation.

Petunias

This very free-flowering plant is particularly suitable for dry conditions. Many gardeners over-water petunias with the result that the flowering is not so brilliant as it would be under dry conditions. The bedding types should be selected for display purposes. The small, single flowered varieties, which grow to a height of about 1 foot, e.g. *Rose of Heaven*

and *Periwinkle Blue,* can be spaced about 12 inches apart. Another type is the taller-growing bedding petunia, which grows to a height of about 18 inches. This variety also will grow and flower freely under dry conditions.

Nasturtiums

The garden nasturtium may be planted this month, provided it is given a semi-sheltered situation. These plants flower much better if the water supply is restricted, but they do not require to be put out in the blazing sun. The Gleam and Globe types grow to a height of about 12 inches and provide a good range of red and yellow colours. Seed should be planted where it is to remain and covered with about 1 inch of soil. If overwatered, this plant makes an abundance of leaves and the flowers are hidden by the foliage.

Cosmos

Cosmos are very useful as a garden subject but require to be protected from wind, and they usually require staking. They grow fairly well in a poor sandy soil, and should be planted about 18 in. to 20 in. apart in groups of three or four plants in each place. They grow to a height of from 4 ft. to 5 ft. and are useful as a cut flower. A good range of colours is available.

Eschscholtzia

Eschscholtzia is more often called the Californian Poppy and is a good subject for dry, gravelly soils, where it flowers freely, the colours being scarlet, crimson, white and gold. The extremely fine seed should be sown where the plants are to flower and after germination thinned out to about 6 inches apart. Although this plant is a perennial, it is better to treat it as an annual.

Portulaca

Various common names are given to the sun-loving portulaca. It is known as Sun Moss, Sun Plant and Rose Moss. It forms a dense carpet of succulent growth about 4 inches above the soil and in hot weather becomes a blaze of colour. Little water is required to establish this plant and it can be used for bedding or edging effects in the garden. The very fine seed should be mixed with about three or four volumes of sand. This will ensure the seed being evenly distributed. Sow it where it is to flower and cover the seed lightly with fine sand.

Amaranthus

Various types of Amaranthus are available. It is a good subject for hot, dry positions, and poor soils frequently intensify the colours of the foliage. A variety named *Tricolor* is commonly named Jacob's Coat, because of its many coloured foliage—a mixture of yellow, red and green. This plant grows to a height of about 2 feet under Victorian conditions. It is noted for the brilliancy of its foliage rather than for the flowers. Space the plants about 1 foot apart.

Antirrhinums

Dwarf, intermediate and tall types of antirrhinum which is familiarly called Snap Dragon, will grow successfully in dry situations. It is a useful flower because it not only makes a bright display in the garden, but also an excellent cut flower and produces new flower spikes after the old have been removed. Plants may be left in position for two seasons at least.

THE VEGETABLE GARDEN

Cabbage

Seed of *Drumhead and Glory Enkhuisen* may be sown this month in seed beds or seed boxes. Cover the seed with about ¼ to ½ inch of fine sandy loam and do not sow the seed too thickly. Best results are obtained if short, sturdy plants are grown in the seed beds and the seed boxes. These stocky plants when planted out in the permanent beds in Feburary or March do not have the same tendency to run to seed.

Seedlings of *Early Jersey Wakefield* and *Henderson's Succession* may be planted out this month. Space the plants about 2ft. 6 in. apart each way.

Cauliflower

Seed of *Early Eclipse* cauliflower may be sown in seed boxes or seed beds this month, but this crop requires to be grown quickly all the time and the seedlings are usually not allowed to become hardened off in the same way as the cabbage seedlings. Promote vigorous growth

and force the plants to make leafy growth after they are planted out in mid-February. This growth can be stimulated by thorough preparation of the soil before planting out. Dig in plenty of well-decayed manure or compost with market-garden manure or blood-and-bone at the rate of 3 or 4 oz. per square yard.

Both cabbage and cauliflower will require regular treament for the control of cabbage white butterfly and cabbage moth. During the summer both these pests are very numerous. Dust with arsenate of lead dust at intervals of about 10 to 14 days.

Tomatoes

Tomato plants which are staked will require to be pruned regularly. Some types as the cluster varieties, e.g. *Salads' Special, Prosperity* and *Potentate* require to be pruned to single leaders. This is done by removing the lateral growth which appears in the axil of the leaves. These lateral growths should be nipped off with the finger and thumb when they are about 1 inch long. If they are allowed to grow longer they will confuse the gardener and will be so much wasted growth when removed. If these cluster varieties are not pruned to single leaders the fruit will be small.

Eccle's Surprise, Marglobe and other globe varieties should be pruned to 2, 3 or 4 leaders and tied to stakes. Staking is an advantage in the home garden because it reduces the amount of tomato grub injury and the fruit is cleaner and has a better opportunity of ripening.

Plants which become affected by Spotted Wilt should be removed and burned, and after handling these, it is advisable to wash the hands before touching healthy plants.

Beans

Another sowing of dwarf French beans can be made this month and *Brown Beauty* still remains the favourite. Plant the seed from 1 to 2 inches deep, about 5 inches apart with 2 to 3 ft. between the rows.

Seed of runner beans can also be planted this month. *Epicure, Kentucky Wonder* and *Scarlet Runner* varieties usually crop well when planted early in December. These varieties can either be grown against walls, fences or on temporary trellises erected in the garden. Sow the seed about 9 inches apart and 1 to 2 inches deep.

Arsenate of lead dust applied through a cover over the plant is most effective for control of the cabbage white butterfly.

Carrots

December is a good month to sow carrot seed. This seed should be sown in drills in the beds where they are going to remain. *Chantenay, Danver's Half Long* and *Intermediate* are all good varieties. Cover the seed with about ½ to ¾ inch of fine sandy soil and as soon as the young seedlings are large enough to handle, thin out to about 3 inches apart. Many gardeners do not succeed in growing carrots because they delay the thinning-out process. The young carrots do not flourish if disturbed later in their growth. If the thinning-out process is done early and good watering is given to the bed after the operation is completed, the remaining carrots will grow quickly.

Silver Beet

Sow the seed of *Fordhook Giant, Lucullus,* and *Dark Green Broad-ribbed* varieties. Usually a single row of this vegetable is sufficient in the home garden. Sow a few seeds at intervals of 9 inches to a foot along the row, and thin out to one plant at each of these spacings. Cover seed with ¾ inch of fine, sandy soil.

IN THE ORCHARD

Contributed by the Horticultural Division

Prevention of Fruit Drop

THE use of synthetic chemicals for the prevention of the pre-harvest drop of apples and pears is rapidly becoming a regular orchard practice. This spray is particularly effective when used on W.B.C. pears. Sprayed on the trees either alone or in combination with the usual arsenate of lead spray, the chemical, although extremely dilute, is absorbed by the fruit, particularly at the stalk end. The chemical has the effect of preventing the formation of a layer of corky tissue in the stalk which results in the premature dropping of fruit. It can be seen, therefore, that thorough spraying of the tree is necessary so that the stalks will be well covered. The effect of the chemical is limited to a period of about 10 to 12 days, so that the spray should be applied within a week of the estimated picking date. Growers requiring further information on the use of this spray should write to the Director, Department of Agriculture, Melbourne, C.2.

Red Spider and Bryobia Mite

The bryobia mite causes a considerable loss of vigour when trees are seriously infested during the growing period. Leaves assume a yellowish drought-stricken appearance, and the mites can be seen in large numbers on the undersides of the leaves. Winter strength sprays of lime sulphur or red oil should be applied as a routine practice for control. During the summer, however, sprays of white oil emulsion, 1½ gallons in 100 of water, will reduce the infestation. Winter sprays are ineffective for red spider on almond trees. Use the spray of white oil mentioned above or a spray of 1½ gallons lime sulphur plus 5 lb. colloidal sulphur in 100 gallons of water. For all summer sprays, direct the jet upwards so that the undersurface of the leaves is wetted.

Other Diseases and Pests

Many inquiries have been received concerning various pests and diseases which have appeared recently on fruit trees but for which prevention is the only cure, and consequently no satisfactory control measures can be recommended at this time of the year. For home gardeners, from whom most of these inquiries are received, the commoner troubles are described hereunder, together with advice as to when control should be undertaken.

Erinose.

Erinose is a condition which occurs in vines and is caused by a microscopic mite. Raised areas appear on the leaves ¼ to ½ inch in diameter, on the undersides of which is a thick layer of hair. Similar conditions occur on walnut and poplar leaves. For control, spray with lime sulphur, three pints in four gallons, just before bud-burst.

Pear Leaf Blister Mite.

Small, pinkish-coloured raised lumps, not much bigger than a pin's head, appear in large numbers on leaves and sometimes on the fruit attacked by the pear leaf blister mite. For the control of the trouble mix 3 pints of lime sulphur to 4 gallons water and spray at bud burst.

Peach Leaf Curl.

Peach leaf curl caused by a fungous disease should be distinguished from curling, which may be caused by aphids. Leaf curl is caused by a fungus which spends the winter in the form of spores on the buds of peaches and nectarines. It is characterized by a pronounced thickening and curling of the leaves, which change colour to yellow and red. In severe infection, young shoots may be attacked. The correct itme for control is in the spring when the buds are showing pink. Bordeaux mixture 6.4.40 should be used.

Scab or "Shot Hole" of Stone Fruits.

If the leaves of apricot trees have small holes in them and the skin of the fruit is marred by small dark brown or purplish scabs, the tree is probably affected by the fungous disease known as "shot hole." Peach, plum, and almond trees may be affected also, in which case purplish spots appear on the leaves and, in some cases, gumming of the buds may occur. For control, two sprays with Bordeaux mixture are required—one at leaf fall and another when the buds are just opening, at the "pink" stage.

[*Continued on page 562.*

THE PRESERVATION OF BERRY FRUITS

By RUTH BROMFIELD, Fruit Preserving Branch

BECAUSE of their attractive flavour and appearance and their high Vitamin C content, berry fruits are highly regarded by housewives for use as preserves.

Bottled Berries

Bottled berries require a very short processing period and are little trouble to prepare. Raspberries, loganberries, and blackberries are the main kinds bottled, but there are lesser-known varieties, such as the Youngberry (said to be a cross between a loganberry and blackberry) and the Boysenberry (a cross between the raspberry, loganberry, and blackberry), which preserve excellently. Strawberries do not bottle well, shrinking considerably and losing their colour and flavour.

Whenever possible, berry fruits should be preserved the day they are picked, because, like all soft fruits, they are easily bruised, and rapidly deteriorate, due to the development of yeasts and moulds. Only berries which are firm-ripe should be used for bottling.

The fruits should be lightly washed by putting in a colander and allowing water to run gently over them. They are then stemmed and cleaned, and packed firmly, but without crushing, into jars. This is best done by putting a few berries in the jar at a time and shaking into position, proceeding layer by layer. Sugar may be sprinkled throughout. No liquid is added before processing, as the heat causes the juice to run from the fruit, partially filling the jars. The packed jars, with lids resting on top, are placed on a 4-in. stand in the sterilizer and cold water added to cover just below the surface of the stand. Adjust the lid on the sterilizer, bring the water to the boil, and keep it boiling for 10 to 12 minutes for quart-size jars. At the end of the processing period, remove the jars one at a time and overflow with boiling syrup made by dissolving 1 cup of sugar to each pint of water. Seal the jars immediately.

Another method is to sterilize the fruit in the oven. Stand the jars, filled with fruit, on cardboard or asbestos in the lower part of a cold oven. Lids may be rested on top of the jars, but rubber rings and inserts should be sterilized separately by boiling them for 10 minutes. Raise the oven to a moderate heat (225-250°F.) and maintain it until the fruit appears cooked. It should take no longer than 30 minutes after the oven reaches the desired temperature. When the fruit is cooked, remove the jars one at a time, overflow with boiling syrup, quickly adjust the rubbers and lids, and seal airtight. Store bottled berry-fruits in a dark place.

Jams and Conserves

There are many delicious berry jams and conserves which are a welcome addition to the cupboard. Some of the less common recipes are given below. Little or no water is added to berry jams, and the pulp is thick. When the sugar is added to the hot pulp, it must be quite dissolved in the pulp before it is boiled again, otherwise the jam may burn.

Raspberry Jam.—This recipe retains all the original flavour of the raspberry. Stem the fruit, weigh it, then place it in a preserving pan. Crush the fruit with a wooden spoon and bring to boiling point. Meanwhile, heat an equal weight of sugar in the oven. When the fruit comes to the boil, add the heated sugar and stir till it is dissolved. After the mixture comes to the boil again, cook for 3 minutes only. Bottle and seal.

Raspberry and Red Currant Conserve.—2 lb. red currants; 4 lb. raspberries; 6 lb. sugar. Stem the currants and put in preserving pan, crushing them a little to draw the juice. Boil gently for 8 to 10 minutes with the lid on the

pan, then add the raspberries and sugar. When the sugar has dissovled, boil rapidly without the lid on the pan for 10 to 15 minutes or until sufficiently thick.

Strawberry Conserve.—3 lb. firm strawberries; 1 pint of red currant juice or apple juice, or 1 pint water plus the juice of 2 lemons; 3 lb. sugar. (The red currant or apple juice is made by simmering the fruit in sufficient water to cover it until the fruit is tender, then straining.) Sprinkle half the sugar on the berries and leave overnight, then cook them for about 20 minutes in the juice which the sugar has extracted. Add the liquid, bring to the boil, and add the remainder of the sugar. When the sugar is dissolved, boil rapidly till the conserve is of the desired consistency, usually about 15 minutes. Allow to stand a few minutes before bottling. Seal when cold.

Gooseberry and Strawberry Jam.—4 lb. green gooseberries; 4 lb. strawberries; 3 quarts water. Boil the gooseberries in the water until a slight pink tint is visible, then add the strawberries and boil for 10 minutes. Measure the juice and pulp and add three-quarters of a cup of sugar to 1 cup of mixture. Dissolve the sugar and bring to the boil, then cook rapidly until the mixture jellies when tested, or a good consistency is obtained (20 to 40 minutes). Bottle, and seal when cold.

Loganberry and Cherry Plum Jam.—3 lb. loganberries; 3 lb. cherry plums; 4½ lb. sugar. Put the plums on to cook with about 1 cup of water. When they are fairly soft, add the loganberries and boil for about another 10 minutes; then add the sugar, and after it is dissolved, boil quickly until of a good consistency (20 minutes approximately).

Blackberry Jam.—Wash 3 lb. of berries and put the fruit into a pan with ½ pint of water. Bring slowly to the boil and simmer with the lid on the pan until the fruit is quite soft. Add the strained juice of 3 lemons and 3 lb. sugar. Stir until the sugar is dissolved and then boil steadily until the jam bubbles with a slight gurgling sound. Bottle, and seal when cold. It will be of a nice thick consistency.

Blackberry and Apple Butter.—Equal quantities of apples and blackberries are required. Wash the apples and cut into slices without removing the skins or cores. Pick over the blackberries, carefully discarding any that are unsound. Put both kinds of fruit into one preserving pan with just enough water to keep them from burning. Cook until reduced to a pulp, stirring frequently, then sieve to remove the skins and seeds. Measure or weigh the sieved pulp and return it to the pan. Add sugar, pound for pound or cup for cup of pulp, dissolve it, and stir constantly for 20 minutes at the boil, or until no liquid separates out from the pulp. Bottle and seal.

Berry Fruit Syrup

The berry fruits also make delightful fruit syrups for use in drinks. To make the syrup, put the berries in a basin and heat over hot water until the juice runs freely, then strain through a cloth. Sugar may be added according to taste—the usual proportion recommended is 2 cups of sugar to 3 cups of juice, although it is not necessary to add any sugar. Dissolve the sugar in a little of the juice, then mix with the remainder before putting into bottles which have well-fitting corks. The bottles should be quite clean and the corks should be boiled in water for 10 minutes before use. Fill the bottles right to the top and place corks loosely on the top. The bottles are placed on a stand in a vessel for pasteurizing. Water is added to reach up to the necks of the bottles. The lid is placed on the vessel and the temperature raised to 180-185°F. for 30 minutes. At this temperature the water should be simmering. The bottles are then removed, the corks pressed in and sealed with melted tallow or paraffin wax.

IN THE ORCHARD—*continued from page 560.*

Green Peach Aphis.

The green peach aphis is a small green insect which clusters thickly in the new growth of peach and nectarine trees. It is, however, difficult to control satisfactorily with sprays of nicotine sulphate, and adequate control can be obtained only by the use of a tar distillate spray used at the rate of one pint in four gallons of water before the middle of July.

Those readers who have trees suffering from any of the above-mentioned pests or diseases should take the necessary control measures during next winter and spring.

The Use of Vinegar in the The Home-Bottling of Vegetables

The Fruit Preserving Expert

IT was recently announced that the home bottling of vegetables (without the use of a pressure cooker) could not be recommended, in view of the fact that sterilization at the temperature of boiling water did not ensure the destruction of an organism which might later develop a poisonous toxin. This danger does not exist however, when the medium in which the vegetables are bottled is sufficiently acid, and recent trials have shown that certain vegetables are both safe and palatable when processed in a mixture of vinegar (1 part) and water (5 parts). The presence of this proportion of brown or white vinegar in the brine gives a degree of acidity sufficient to prevent the development of these harmful bacteria, provided the vegetables are then sterilized in the usual way. An added safeguard is to boil the preserved vegetables for 10 minutes after removal from the jar and prior to use; this precaution is not essential but it helps to remove the vinegar flavour.

Vegetables bottled in vinegar and water may tend to have an objectionable acid flavour, but practical tests have shown that the product is quite palatable and practically free from acid flavour if it is soaked for some hours in water prior to use. Little difference was noted in flavour whether brown or white vinegar was used, but generally speaking, the addition of white vinegar to the brine gave best results as, after soaking, no vinegar flavour was detected with certain vegetables and practically none with all other vegetables tried, and the colour in all cases was good. With brown vinegar, the acid flavour was slightly stronger and the colour with some vegetables was slightly affected by a brownish tinge.

Intermittent Sterilizing of Vegetables

Most vegetables are lacking in acid and unless vinegar is added to the brine, must be sterilized in a pressure cooker. Where this is not available the following method, involving the use of vinegar and intermittent sterilization, can be used.

Prepare vegetables as for cooking by scrubbing or peeling and cutting as required, then blanch by dipping in boiling water. Beans and peas take five minutes, root vegetables 15 minutes, while leafy vegetables may be steamed for five minutes. After blanching plunge immediately into cold water. Drain and pack into jars. Fill the jars with a brine and vinegar mixture (quantities given above). The mixture should be boiled very gently with a lid on the pan, for five minutes, then cooled. Place lids loosely on the jars, or if vacuum jars they may be sealed.

Place the jars on a platform standing 4 inches high in a sterilizer and pour in cold water to reach just below the level of the stand. Bring the water gently to the boil and boil for 1 hour, then seal the jars immediately.

The jars should stand for 24 hours, then the seals of the jars are loosened and the jars again placed in the sterilizer, brought to the boil as before, and sterilized for 1 hour. After processing, the jars should be filled with boiling brine and sealed. They are allowed to stand for another day, then processed again for another hour, refilled and sealed. After this the jars may be cooled and stored.

Carelessness in sealing, perished rings and understerilizing will cause vegetables to spoil. Never use vegetables with a bad colour or odour, or those cloudy or bubbly in appearance. Burn or bury the contents of such bottles.

The following varieties of vegetables give excellent results if bottled in vinegar brine as described:—

Pumpkin	Parsnip
Carrot	White Onion
French Bean	Swede Turnip
Pea	White Turnip

Cabbage

Standard Herd Records

For Quarter ended 30th September, 1944

In the following is set out the records of all cows which completed a lactation during the quarter. The number is 514, of which 329 qualified for the certificate. The figure in brackets after the owner's name shows the number of entries.

The amount of butter-fat required for qualification varies with the age class to which the animal belongs, the standard being as follows :—

Junior 2-year old (under 2½ years at time of calving)	230 lb. butter-fat.
Senior 2-year old (between 2½ and 3 years at time of calving) ..	250 lb. butter-fat.
Junior 3-year old (between 3 and 3½ years at time of calving) ..	270 lb. butter-fat.
Senior 3-year old (between 3½ and 4 years at time of calving) ..	290 lb. butter-fat.
Junior 4-year old (between 4 and 4½ years at time of calving) ..	310 lb. butter-fat.
Senior 4-year old (between 4½ and 5 years at time of calving) ..	330 lb. butter-fat.
Mature cow 5 years and over	350 lb. butter-fat.

N.C.K. denotes no chart kept.

Name of Cow.	Herd Book No.	No. of Days in Test.	Milk Last Day of Test. lb.	Milk. lb.	Average Test.	Butter Fat. lb.	Standard Required.	Class.	Previous Yields of Butter Fat.	Sire.
Andrew, W., Whittlesea, Ayrshire (1).										
Scotswood Mayflower 2nd	33058	273	26	10,683	3·83	409·4	350	Mature	.. ..	Summerhill Digger
Atkinson, W. K., Swan Hill, Dairy Shorthorn (30).										
Steventon Dog Rose (Imp.)	242A	273	19½	12,000	3·17	380·5	350	Mature	382, 392, 286, 305, 303, 405	Stokelycross Admiral
Willow Park Blush 10th ..	1641D	273	9	12,689	3·52	447·0	350	Mature	353, 364, 409, 486	Wickelsham Lord Barrington 5th (Imp.)
Willow Park Blush 21st ..	C.C.	273	10	6,225	3·71	230·9	230	Jr. 2	.. ..	Anderson Imperial Cran 6th (Imp.)
Willow Park Camelia 18th	524D	273	40	13,926	3·96	550·9	350	Mature	332, 423, 456, 470, 510	Wicklesham Lord Barrington 5th (Imp.)
Willow Park Comet 14th ..	528D	273	17	8,795	4·15	364·9	350	Mature	290, 381, 384, 423, 436, 413, 376	Wicklesham Lord Barrington 5th (Imp.)
Willow Park Comet 17th ..	531D	273	10	13,340	4·17	556·8	350	Mature	273, 320, 325, 315, 445	Wicklesham Lord Barrington 5th (Imp.)
Willow Park Comet 30th ..	C.C.	273	7½	5,553	3·57	198·1	270	Jr. 3	255 ..	Anderson Imperial Cran 6th (Imp.)
Willow Park Comet 31st ..	C.C.	273	14½	8,645	3·31	286·5	270	Jr. 3	307 ..	Willow Park Barrington 77th
Willow Park Comet 36th ..	C.C.	273	20	7,514	3·67	276·0	230	Jr. 2	.. ..	Willow Park Imperial Cran 10th
Willow Park Countess 32nd	1663D	240	4	7,215	3·30	237·8	350	Mature	314, 270, 240	Anderson Imperial Cran 6th (Imp.)
Willow Park Crocus 2nd ..	2043E	273	7	8,318	3·44	286·1	310	Jr. 4	267, 262 ..	Willow Park Barrington 51st
Willow Park Dainty 14th..	1667D	273	6	12,003	3·78	454·2	350	Mature	301, 313, 409, 411, 463	Wicklesham Lord Barrington 5th (Imp.)
Willow Park Dainty 22nd	C.C.	273	13½	6,909	3·25	224·5	230	Jr. 2	.. ..	Anderson Imperial Cran 6th (Imp.)
Willow Park Damsel 18th	C.C.	273	17½	7,269	3·38	246·0	230	Jr. 2	.. ..	Anderson Imperial Cran 6th (Imp.)
Willow Park Duchess 28th	543D	273	18½	9,384	3·56	334·2	350	Mature	239, 302, 306, 387, 446, 317, 331	Wicklesham Lord Barrington 5th (Imp.)
Willow Park Duchess 60th	C.C.	273	22	7,209	3·68	265·6	230	Jr. 2	.. ..	Anderson Imperial Cran 6th Imp.)
Willow Park Fairy 10th ..	550D	273	25½	8,595	3·93	338·1	350	Mature	269, 325, 352, 392, 404, 425	Wicklesham Lord Barrington 5th (Imp.)
Willow Park Fairy 12th ..	1530C	273	13	9,801	3·07	301·2	350	Mature	354, 425, 335, 366	Anderson Imperial Cran 6th (Imp.)
Willow Park Melba 25th ..	554D	273	19	8,907	3·63	323·0	350	Mature	282, 377, 508, 408, 433	Wicklesham Lord Barrington 5th (Imp.)
Willow Park Melba 27th ..	556D	273	20½	9,577	3·51	336·6	350	Mature	301, 376, 394, 418, 420	Wicklesham Lord Barrington 5th (Imp.)
Willow Park Moss Rose 17th	1692D	273	5½	7,845	3·84	301·2	350	Mature	333, 306, 335	Anderson Imperial Cran 6th (Imp.)
Willow Park Moss Rose 18th	1693D	273	9	10,565	3·13	330·2	350	Mature	318, 276, 382	Wicklesham Lord Barrington 5th (Imp.)

Name of Cow.	Herd Book No.	No. of Days in Test.	Milk Last Day of Test. lb.	Milk. lb.	Average Test.	Butter Fat. lb.	Standard Required.	Class.	Previous Yields of Butter Fat.	Sire.
W. K. Atkinson, Swan Hill, Dairy Shorthorn—*continued.*										
Willow Park Moss Rose 21st	2049E	273	13	9,786	3·40	332·3	330	Sr. 4	346, 300 ..	Willow Park Imperial Clan 3rd
Willow Park Moss Rose 27th	C.C.	273	17½	8,708	3·42	297·8	230	Jr. 2	.. ..	Willow Park Barrington 77th
Willow Park Queenie 41st	563D	273	17½	14,198	3·57	506·9	350	Mature	312, 308, 399, 437	Wicklesham Lord Barrington 5th (Imp.)
Willow Park Queenie 43rd	1534C	273	28½	14,230	3·20	455·1	350	Mature	370, 403, 403	Anderson Imperial Cran 6th (Imp.)
Willow Park Red Rose ..	1447A	273	9	11,089	3·53	391·2	350	Mature	314, 267, 348	Anderson Imperial Cran 6th (Imp.)
Willow Park Red Rose 2nd	1448A	273	9	8,490	2·57	218·4	270	Jr. 3	235 ..	Willow Park Barrington 77th
Willow Park Red Rose 3rd	C.C.	273	7	6,097	3·47	211·3	230	Jr. 2	.. ..	Willow Park Barrington 77th
Willow Park Rosette ..	C.C.	273	18	7,730	2·98	230·0	230	Jr. 2	.. ..	Anderson Imperial Cran 6th (Imp.)
Ballarat Orphanage, Ballarat, Jersey (8).										
Gowanlea Oxford's Gipsy ..	37788	273	5	5,763	4·84	278·8	350	Mature	324, 387, 488, 415, 367, 362, 324	Oxford Beau's Pretty Oxford (Imp.)
Latrobe Butterwinks 12th	C.R.	273	N.C.K.	5,715	5·38	307·4	230	Jr. 2	.. ..	Latrobe Oscar
Merunda Delight ..	49537	273	N.C.K.	5,805	5·12	297·1	350	Mature	433, 290, 313	Murona Airmine
Orphanage Attraction 18th	83287	273	N.C.K.	7,002	5·30	371·0	310	Jr. 4	308, 320 ..	Banyule Terraplane
Orphanage Melba 14th ..	68461	273	N.C.K.	6,806	5·17	351·7	350	Mature	433, 444, 465, 343	Banyule Terraplane
Orphanage Mirthmaker 11th	C.R.	273	N.C.K.	5,121	5·26	269·2	230	Jr. 2	.. ..	Banyule Terraplane
Orphanage Molly 4th ..	58822	273	13½	7,211	4·90	353·1	350	Mature	358, 265, 292, 470, 391, 547, 376	Jerseylea Quality Boy
Tobermory Mary ..	79227	273	N.C.K.	4,761	5·72	272·5	310	Jr. 4	326, 280 ..	Samares' Golden Prince (Imp.)
Banyule Pty. Ltd., Wangaratta, Jersey (6).										
Banyule Ettie 23rd ..	80158	273	12	5,587	5·26	293·7	270	Jr. 3	281 ..	Heatherlea Regent (Imp.)
Banyule Silvermine 134th..	70194	273	28	8,939	5·14	459·5	330	Sr. 4	471, 482 ..	Banyule Upcast
Banyule Silvermine 140th..	80165	273	23	6,657	5·28	351·5	250	Sr. 2	253 ..	Heatherlea Regent (Imp.)
Banyule Siren	85087	273	21½	6,020	5·00	301·1	230	Jr. 2	.. ..	Banyule Silvius
Kintore Victory Jean ..	Vol. 31	273	18	5,181	4·76	246·6	230	Jr. 2	.. ..	Kintore Northern King
Kintore Victory Mavis ..	Vol. 31	273	18	5,153	5·50	283·2	230	Jr. 2	.. ..	Kintore Northern King
Bennett, J. W., Yinnar, Jersey (7).										
Ellendale Bluebell 17th ..	76075	273	N.C.K.	6,476	5·53	358·2	350	Mature	441, 512 ..	Avalon Prince Madeira
Ellendale Cloudy 9th ..	Vol. 31	273	N.C.K.	6,825	5·64	385·1	270	Jr. 3	393 ..	Staghorn Bellboy
Ellendale Duchess ..	47972	273	N.C.K.	7,701	4·35	335·1	350	Mature	391, 447, 424, 354	Glen Iris Master Clement
Ellendale Duchess 8th ..	81164	273	N.C.K.	7,421	4·84	358·9	310	Jr. 4	399 ..	Avalon Prince Madeira
Ellendale Duchess 12th ..	Vol. 31	273	N.C.K.	5,135	5·75	295·3	230	Jr. 2	.. ..	Taranah Rajah
Ellendale Romany 19th ..	C.R.	273	N.C.K.	5,409	5·15	278·4	250	Sr. 2	305 ..	Ellendale Banksia 2nd's Bellboy
Ellendale Romany 20th ..	C.R.	273	N.C.K.	6,387	4·96	317·1	250	Sr. 2	358 ..	Ellendale Banksia 2nd's Bellboy
Bennett, R. H., Lancefield, Jersey (1).										
Edenhope Necklace ..	71113	273	13	7,691	4·59	353·1	350	Mature	229, 345, 312, 340	Lancefield Madeira's Chance
Black, Estate of the late I. S., Noorat, Ayrshire (2).										
Mount Noorat Badalia ..	34880	273	17½	7,203	4·80	346·1	270	Jr. 3	271 ..	Sandhill Kipling (Imp.)
Mount Noorat Taffinnia ..	35703	273	21	7,565	4·12	311·6	230	Jr. 2	.. ..	Sandhill Kipling (Imp.)
Bott, J., Yarrawonga, Red Poll (1).										
Blackwood Mimic ..	Vol. 12	210 (Herd withdrawn)	..	8,250	3·68	303·3	270	Jr. 3	287 ..	Blackwood Mars
Broad, Mrs. A. A. Sutton Grange, Jersey (9).										
Grangelea Begonia ..	76588	273	20	7,051	4·82	339·8	350	Mature	264, 338 ..	Grangelea Butter Boy 5th
Grangelea Damsel 6th ..	66753	273	15½	6,048	5·54	334·9	350	Mature	326, 366, 370, 362	Grangelea Roderick 2d
Grangelea Damsel 7th ..	81594	273	20	5,872	5·38	316·2	270	Jr. 3	311 ..	Navua Wonderful Count
Grangelea Petal	81596	273	17	6,231	5·33	332·4	270	Jr. 3	267 ..	Banyule Macon
Grangelea Rosetta ..	81598	273	15½	5,717	5·38	307·7	250	Sr. 2	273 ..	Navua Wonderful Count
Grangelea Royal Bell ..	86637	273	15	4,387	5·55	243·3	230	Jr. 2	.. ..	Navua Wonderful Count
Grangelea Velvetation ..	81599	273	11	5,484	5·88	322·5	270	Jr. 3	260 ..	Grangelea Roderick 2nd
Grangelea Vera	86638	273	15	5,025	5·27	264·9	230	Jr. 2	.. ..	Navua Wonderful Count
Grangelea Vida	76594	273	11½	6,147	5·24	322·1	310	Jr. 4	296, 392 ..	Banyule Upcast
Broad, A. J., Pyramid, Jersey (1).										
Lynlea Mayflower 2nd ..	Vol. 31	273	N.C.K.	4,850	5·51	267·3	230	Jr. 2	.. ..	Grangelea Max

Name of Cow.	Herd Book No.	No. of Days in Test.	Milk Last Day of Test. lb.	Milk. lb.	Average Test.	Butter Fat. lb.	Standard Required.	Class.	Previous Yields of Butter Fat.	Sire.
Bruhn, C. H., North Mirboo, Jersey (3).										
Eltekon Queen's Guide ..	C.R.	273	N.C.K.	4,088	5·86	239·4	270	Jr. 3	.. ..	Silverbrae Volunteer
Eltekon Queen's Hope ..	Vol. 31	240	4	3,435	5·70	195·7	230	Jr. 2	.. ..	Lauriston Prince
Lauriston Northwood Belle 4th	87389	273	N.C.K.	5,793	5·01	290·5	250	Sr. 2	.. ..	Werribee Grandee
Butcher, F. T., Swan Hill, Red Poll (13).										
Maryville Dainty ..	7860A	273	17	8,544	4·80	410·3	310	Jr. 4	272, 357 ..	Victoria Generator B
Maryville Elma	Vol. 12	273	11	6,719	4·39	294·7	270	Jr. 3	233 ..	Victoria Generator B
Maryville Elva	3722A	273	20	8,835	3·84	339·5	350	Mature	304, 402, 356, 400, 239, 437, 419, 323	Victoria King Bird
Maryville Etta	5049B	273	14½	9,723	4·04	392·6	350	Mature	340, 363, 376, 400, 322, 463	Victoria Viking
Maryville Evonne ..	Vol. 12	252 (Sold)	..	4,437	4·10	181·9	230	Jr. 2	.. ..	Temperley Prism
Maryville Fay	6910A	273	21½	9,729	3·93	381·9	350	Mature	218, 290, 343, 349	Temperley Prism
Maryville Mermaid ..	Vol. 12	273	18½	7,313	3·95	288·5	270	Jr. 3	257 ..	Victoria Generator B
Maryville Minnie ..	8021C	273	11	9,353	4·27	399·2	350	Mature	285, 300, 376	Temperley Prism
Maryville Miranda ..	Vol. 12	273	12	6,926	4·23	293·0	230	Jr. 2	.. ..	Victoria Generator B
Maryville Model	6911A	249	4	9,697	4·23	410·4	350	Mature	256, 375, 394, 368	Temperley Prism
Maryville Olga	8022C	273	8½	8,463	3·96	334·9	310	Jr. 4	342, 350 ..	Victoria Generator B
Maryville Rosaline ..	Vol. 12	273	9	6,716	4·26	286·2	230	Jr. 2	.. ..	Victoria Generator B
Maryville Sheila	Vol. 12	273	6	6,722	4·21	282·7	230	Jr. 2	.. ..	Temperley Prism
Carne, W. J., Pakenham Upper, Jersey (2).										
Wonga Park Songbird ..	74607	273	N.C.K.	7,977	5·63	449·3	350	Mature	404, 437, 491, 533	Wonga Park Minx's Ace
Wonga Park Standard Rose	89696	273	N.C.K.	6,375	5·30	337·6	270	Jr. 3	371 ..	Brampton Noble Standard (Imp.)
Chirnside, R. M., Whittlesea, Jersey (10).										
Mornmoot Fancy Starbright 8th	77850	273	18	8,396	5·43	456·0	270	Jr. 3	369 ..	Werribee Laverock
Mornmoot Princess Madeira 9th	58569	273	25	9,588	5·89	564·6	350	Mature	426, 551, 661, 632, 652	Werribee Warrior
Mornmoot Fancy Starbright 12th	82939	210 (Sold)	..	4,860	4·92	239·0	230	Jr. 2	.. ..	Mornmoot War Lord
Mornmoot Golden Cream ..	72946	240 (Sold)	..	10,560	4·75	502·1	330	Sr. 4	372, 582 ..	War Valour (Imp.)
Mornmoot Mimi	58567	273	30	9,962	4·87	485·6	350	Mature	413, 542, 610, 660, 570	War Valour (Imp.)
Mornmoot Princess Madeira 17th	68097	273	25	9,598	5·56	533·7	350	Mature	449, 581, 634	War Valour (Imp.)
Mornmoot Princess Madeira 21st	72952	273	36	11,792	5·38	634·4	310	Jr. 4	460, 588 ..	War Valour (Imp.)
Mornmoot Princess Madeira 24th	82945	273	7	4,108	5·17	212·5	230	Jr. 2	.. ..	Mornmoot Satisfaction's Golden
Mornmoot Princess Madeira 26th	82947	273	32	9,598	4 39	421 3	230	Jr. 2	.. ..	Navua Paxie's Volunteer
Mornmoot Satisfaction 9th	77856	273	21½	7,640	5·42	413·8	250	Sr. 2	338 ..	Werribee Laverock
Clarke, F. W., Toora, Jersey (7).										
Mer Vue Butterball ..	67907	273	N.C.K.	7,097	5·41	383·9	350	Mature	360, 287, 408, 382, 423	Berrington Largo
Mer Vue Butterball 2nd ..	77700	273	N.C.K.	6,291	7·01	441·2	350	Mature	304, 399 ..	Mer Vue Great Boy
Mer Vue Choice Light ..	C.R.	273	N.C.K.	6,971	6·18	430·7	270	Jr. 3	343 ..	Mer Vue Jupiter
Mer Vue Kathleen ..	82781	273	N.C.K.	6,335	4·66	294·9	330	Sr. 4	306, 348 ..	Mer Vue Great Boy
Mer Vue Lilac's Bloom ..	C.R.	273	9½	3,704	6·68	247·6	250	Sr. 2	.. ..	Mer Vue Jupiter
Mer Vue Miss Marge ..	Vol. 31	273	N.C.K.	5,667	5·37	304·3	330	Sr. 4	.. ..	Berrington Largo
Mer Vue Wee Doris 2nd ..	77707	273	N.C.K.	7,335	5·73	420·4	350	Mature	312, 371 ..	Mer Vue Student Lad
Clark, P. W., and Son, Whittlesea, Jersey (5).										
Coodardy Centurion's Annette	70823	273	15	7,872	4·94	388·9	350	Mature	345, 471, 409	Werribee Centurion
Coodardy Rupert's Annette 3rd	85716	273	14	6,427	5·73	368·2	250	Sr. 2	.. ..	Brucevale Lord Rupert
Mornmoot Princess Madeira 12th	63203	273	10	5,490	5·21	285·9	350	Mature	329, 439, 459, 326	Werribee Viceroy
Toorongo Chevy	89339	273	10	5,580	6·22	347·0	270	Jr. 3	405 ..	Werribee Centurion
Werribee Lillian ..	79584	273	10	6,439	5·39	346·8	270	Jr. 3	325 ..	Staghorn Master Clement
Colenso, L. W. R., Alvie, Jersey (3).										
Normandie Alsyke 5th ..	88268	273	14	7,364	3·81	280·4	310	Jr. 4	314 ..	Normandie Playmate
Normandie Ilma 3rd ..	45472	273	20	7,914	5·76	455·7	350	Mature	241, 376, 366, 387, 460, 590, 611	Peer of Lewisham
Normandie Lady May ..	83193	273	15	6,078	4·04	270·0	270	Jr. 3	311 ..	Lewisham Playboy

Name of Cow.	Herd Book No.	No. of Days in Test.	Milk Last Day of Test. lb.	Milk. lb.	Average Test.	Butter Fat. lb.	Standard Required.	Class.	Previous Yields of Butter Fat.	Sire.
Cook, D. E., Loch, Jersey (8).										
Wattle Vale Fay ..	84502	273	N.C.K.	5,771	5·12	295·4	350	Mature	299, 275 ..	Ewelme Eileen's Northerner
Wattle Vale Glitter ..	79540	273	N.C.K.	5,380	5·22	281·0	350	Mature	436, 400 ..	Ewelme Eileen's Northerner
Wattle Vale Lustre ..	64842	273	N.C.K.	4,860	5·02	244·1	350	Mature	393, 353 ..	Wattle Vale Stud Master
Wattle Vale Magic ..	79544	273	N.C.K.	4,859	4·76	231·2	330	Sr. 4	198, 174, 247	Wattle Vale Golden Age
Wattle Vale Sedate 2nd ..	C.R.	273	N.C.K.	4,436	6·31	280·0	350	Mature	.. ..	Ewelme Eileen's Northerner
Wattle Vale Silky ..	89574	273	N.C.K.	3,252	6·12	199·1	270	Jr. 3	205 ..	Wattle Vale Limelight
Wattle Vale Sister Olive ..	46657	273	N.C.K.	5,018	6·13	307·8	350	Mature	.. ..	Retford Deer's Noble
Wattle Vale Starbright ..	64843	273	N.C.K.	6,330	4·48	283·4	350	Mature	375 ..	Ewelme Eileen's Northerner
Coulthard, J. J., Whittlesea, Jersey (6).										
Walamba Lady Balsom ..	Vol. 31	273	9	4,107	5·57	228·9	230	Jr. 2	.. ..	The Wattles Gamboge 3rd
Walamba Ladybird ..	39564	273	N.C.K.	5,511	5·37	295·7	350	Mature	195, 259, 313, 359, 346, 272	Clarendon Eyre Brigadier 3rd
Walamba Lynette ..	C.R.	273	N.C.K.	3,594	5·03	180·9	230	Jr. 2	.. ..	The Wattles Gamboge 3rd
Walamba Nellie Grey ..	84427	273	N.C.K.	5,544	5·21	288·9	310	Jr. 4	359, 250 ..	Airlie Don
Walamba Rosalie ..	84428	273	N.C.K.	5,991	5·33	319·2	350	Mature	326, 351, 324	Selsey Wonderful Boy
Walamba Rosebud ..	C.R.	273	N.C.K.	3,203	4·60	147·4	230	Jr. 2	.. ..	The Wattles Gamboge 3rd
Cowan, G. L. S., Bacchus Marsh, Friesian (9).										
Ingolston Peeress ..	4732	273	N.C.K.	9,795	3·57	350·0	350	Mature	465, 431, 364	Cordyline Cremona Pontiac
Upper Lappan Duchess ..	6068	273	N.C.K.	13,630	3·82	520·9	350	Mature	432, 445, 465	Polygon Bells' Springfield
Upper Lappan Edna ..	6069	273	N.C.K.	11,505	3·70	425·7	350	Mature	316, 378, 403	Elgin Glen Segis
Upper Lappan Mayfield ..	Vol. 15	273	N.C.K.	11,334	3·46	392·4	310	Jr. 4	280, 363 ..	Upper Lappan Pontiac
Upper Lappan Melba ..	Vol. 15	273	N.C.K.	8,570	3·69	316·1	270	Jr. 3	236 ..	Upper Lappan Pontiac
Upper Lappan Ollie ..	Vol. 15	273	N.C.K.	11,935	3·41	406·8	350	Mature	267, 350, 395	Elgin Glen Segis
Upper Lappan Snowdrop ..	Vol. 15	273	N.C.K.	7,932	3·41	270·4	250	Sr. 2	.. ..	Upper Lappan Pontiac
Upper Lappan Snowflake ..	Vol. 15	273	N.C.K.	7,551	3·64	275·2	250	Sr. 2	.. ..	Upper Lappan Pontiac
Upper Lappan Tessa ..	C.R.	273	N.C.K.	8,724	3·75	3,273	290	Sr. 3	274 ..	Upper Lappan Pontiac
Cuddihy, T. D., Geelong, Jersey (1).										
Pivot Pearl 3rd	C.R.	240 (Sold)	..	2,280	4·65	106·0	230	Jr. 2	152 ..	Pivot Billie
Dennis, Mrs. A. A., Frankston, Jersey (1).										
Ballam Lilac's Dream ..	80090	273	24	7,557	5·86	443·2	250	Sr. 2	398 ..	Ballam Preference
Department of Agriculture, Burnley, Jersey (2).										
Victoria Flirting Princess ..	74373	273	16	4,505	7·66	345·1	290	Sr. 3	328, 339 ..	Selsey Spotted Prince
Victoria Princess Betty ..	59873	273	23	8,061	4·85	390·9	350	Mature	429, 456, 496, 361, 350	Selsey Viola's Boy
Department of Agriculture, Werribee, Friesian (8).										
Victoria Amarette ..	Vol. 15	273	6	8,577	3·49	299·6	230	Jr. 2	.. ..	Rupertswood Dutch Prince
Victoria Belfris	Vol. 15	273	32	12,056	3·58	432·2	230	Jr. 2	.. ..	Terling Hypothesis (Imp.)
Victoria Belle	6075	273	13¾	15,450	3·63	561·5	350	Mature	344, 457, 378	Rupertswood Inka Jo
Victoria Camella ..	Vol. 15	273	19	8,837	3·67	324·5	230	Jr. 2	.. ..	Terling Hypothesis (Imp.)
Victoria Ilkaling ..	Vol. 15	273	16	8,712	3·18	276·7	230	Jr. 2	.. ..	Terling Hypothesis (Imp.)
Victoria Josling ..	Vol. 15	273	33¼	13,018	3·18	414·2	230	Jr. 2	.. ..	Terling Hypothesis (Imp.)
Victoria Primaling ..	Vol. 15	240 (Sold)	..	6,045	3·58	216·3	230	Jr. 2	.. ..	Terling Hypothesis (Imp.)
Victoria Rita	6097	273	24	19,417	3·10	602·3	350	Mature	284, 468, 575, 429	Rupertswood Inka Jo
Department of Agriculture, Werribee, Red Poll (20).										
Victoria Auxiliary ..	7954A	273	7	7,643	5·13	392·2	310	Jr. 4	278, 322 ..	Woodburn Peter Pan
Victoria Beadly	Vol. 12	273	8	7,491	4·54	339·8	230	Jr. 2	.. ..	Burnwood Masterpiece
Victoria Bodikin	7010A	273	17	10,137	4·05	410·8	350	Mature	277, 357, 465, 384	Victoria Goblin
Victoria Cassie	Vol. 12	273	22	9,863	4·01	395·9	290	Sr. 3	326 ..	Victoria Petrology
Victoria Dolories ..	C.R.	273	17	6,434	4·52	291·0	230	Jr. 2	.. ..	Woodburn Peter Pan
Victoria Dumbell ..	Vol. 12	273	4	7,208	4·26	307·3	290	Sr. 3	262 ..	Victoria Petrology
Victoria Forelady ..	Vol. 12	240	4	7,995	3·97	317·4	290	Sr. 3	264 ..	Burnwood Masterpiece
Victoria Glorius	Vol. 12	273	14	9,299	4·40	409·1	270	Jr. 3	338 ..	Burnwood Masterpiece
Victoria Grate	C.R.	273	20	7,284	4·82	351·2	230	Jr. 2	.. ..	Burnwood Masterpiece
Victoria Humour ..	C.R.	273	10	6,377	4·41	281·0	230	Jr. 2	.. ..	Woodburn Peter Pan
Victoria Jazz	Vol. 12	273	9	8,667	4·12	357·2	230	Jr. 2	.. ..	Burnwood Masterpiece
Victoria Locket	C.R.	273	23	7,752	4·00	310·4	230	Jr. 2	.. ..	Burnwood Masterpiece
Victoria Maid	Vol. 12	273	21	7,671	4·55	349·2	230	Jr. 2	.. ..	Victoria Petrology
Victoria Mistress B ..	Vol. 12	273	9	11,432	4·53	517·5	310	Jr. 4	382 ..	Burnwood Masterpiece
Victoria Mountain ..	7965A	273	9	8,556	4·02	344·1	330	Sr. 4	367, 448 ..	Woodburn Peter Pan
Victoria Pan Velvet ..	7586A	273	6	7,998	4·49	359·1	350	Mature	409, 438, 318	Woodburn Peter Pan
Victoria Pepper	Vol. 12	273	29	11,829	3·69	437·0	290	Sr. 3	389 ..	Burnwood Masterpiece
Victoria Rebeller ..	C.R.	273	6	5,057	4·90	247·9	230	Jr. 2	.. ..	Victoria Petrology
Victoria Rosea	Vol. 12	210	4	6,577	3·78	248·5	330	Sr. 4	329, 283 ..	Woodburn Peter Pan
Victoria Volt	4049B	273	11	9,860	4·38	431·9	350	Mature	296, 369, 398, 515, 537, 512, 490, 437, 455, 438	Victoria Vice Captain

Name of Cow.	Herd Book No.	No. of Days in Test.	Milk Last Day of Test. lb.	Milk. lb.	Average Test.	Butter Fat. lb.	Standard Required.	Class.	Previous Yields of Butter Fat.	Sire.
Desmond, J. J., Rochester, Jersey (2).										
Macroon Edna's Lassie ..	82587	273	N.C.K.	7,802	5·65	441·2	350	Mature	430, 403 ..	Macroon Lassie's Mikado
Macroon Skipper's Princess	Vol. 31	273	N.C.K.	6,112	4·85	296·5	310	Jr. 4	320 ..	Clifford Farm V.C's. Skipper
Devon Park Stud Farm (G. S. Daley), Lilydale, Jersey (16).										
Belgonia Design's Noella 3rd	60538	273	22	8,481	4·89	414·9	350	Mature	320, 421, 443, 462, 361	Duke of the Lake (Imp.)
Clarendon Eyre Emerald Isle 4th	56801	273	18	8,429	4·59	387·0	350	Mature	397, 440 ..	Victorious Pioneer (Imp.)
Clarendon Eyre Tangerine 9th	56813	273	24½	8,339	5·10	425·3	350	Mature	375, 446, 493, 565, 442	Victorious Pioneer (Imp.)
Devon Park Empire ..	89565	273	16	5,663	6·42	363·7	230	Jr. 2	.. ..	Karrara Eileen's Aim
Devon Park Pioneer Clementine	85968	273	13	4,623	6·29	290·9	230	Jr. 2	.. ..	Karrara Sporting Standard
Devon Park Pioneer Daisy	85969	273	18	5,741	5·50	316·0	230	Jr. 2	.. ..	Karrara Sporting Standard
Karrara Fancy Madeira 2nd	72116	273	11½	7,700	5·28	406·2	350	Mature	395, 498, 419	Springhurst Perree's Quality
Karrara Oxford's Primrose	77081	273	16	7,146	5·70	407·2	310	Jr. 4	361, 431 ..	Karrara Golden Oxford
Karrara Standard Empire	77086	273	18	7,636	6·01	458·8	310	Jr. 4	387, 531 ..	Brampton Sporting Standard (Imp.)
Karrara Standard Gem ..	77087	273	15½	7,053	5·53	390·2	290	Sr. 3	308, 362 ..	Brampton Sporting Standard (Imp.)
Karrara Standard Noella ..	77089	210	4	3,435	5·62	193·1	290	Sr. 3	294, 312 ..	Brampton Sporting Standard (Imp.)
Karrara Standard Perree ..	77090	273	14	5,237	5·92	309·8	290	Sr. 3	264, 300 ..	Brampton Sporting Standard (Imp.)
Karrara Standard Tecoma	77091	273	10	5,684	5·39	306·6	310	Jr. 4	357, 421 ..	Brampton Sporting Standard (Imp.)
Karrara Tecoma's Eve ..	77092	210	4	3,547	5·47	194·1	350	Mature	375, 336 ..	Karrara Christmas Eve
Selsey Ranunculus 2nd ..	69066	273	15	6,030	5·17	311·8	350	Mature	349 ..	Brampton Sporting Standard (Imp.)
Selsey Ricious 2nd ..	73881	273	17½	7,650	5·77	441·1	350	Mature	321, 450, 533, 524	Samares Golden Prince (Imp.)
Dookie Agricultural College, Dookie, Ayrshire (2).										
Dookie Bebe	32243	273	N.C.K.	7,019	3·67	257·4	350	Mature	325, 412, 279	Tregorland Indispensible
Dookie Bonny	34490	273	N.C.K.	6,092	4·02	244·9	350	Mature	246, 272 ..	Gowrie Park Bonnie Sailor
Doyle, Dr. G., Arthur's Creek Jersey (3).										
Durraween Spangles ..	Vol. 31	180	4	1,522	5·76	87·6	230	Jr. 2	.. ..	Spadale Bright Celebrity
Streamville Joanie ..	Vol. 31	210	4	2,790	5·82	162·5	230	Jr. 2	.. ..	Maxmount Pearl's Laddie
Streamville Phyllis ..	Vol. 31	180	4	2,475	4·78	118·4	230	Jr. 2	.. ..	Maxmount Pearl's Master
Dunmore, T. J., Melton, Jersey (7).										
Laura Dell Blonde Lady ..	82372	273	15	5,898	6·25	368·4	250	Sr. 2	260 ..	Muswell Masterpiece
Laura Dell Bright Bet ..	Vol. 31	273	12	3,788	6·14	232·5	230	Jr. 2	.. ..	Muswell Reflection
Laura Dell Glowena ..	77291	273	16	6,603	5·44	359·3	310	Jr. 4	242, 334 ..	Muswell Reflection
Laura Dell Glow Rose ..	82373	273	16	7,325	5·48	401·6	270	Jr. 3	310 ..	Muswell Reflection
Laura Dell Lillibit ..	72361	273	26	8,631	5·96	514·5	350	Mature	407, 462, 462	Clarendon Eyre Eminent's L'Aiglon
Laura Dell Petal ..	72362	273	18½	6,926	4·20	290·9	350	Mature	279, 317, 211	Brampton Pioneer Chut (Imp.)
Laura Dell Starena ..	77293	273	20	6,712	5·96	400·2	310	Jr. 4	272, 344 ..	Avalon Gladstar 34th
Eltringham, W. B., Lilydale, Jersey (2).										
Clifford Farm Joan ..	70727	273	12½	7,127	6·53	465·3	350	Mature	333, 429, 423	Clifford Farm Danny Boy
Clifford Farm Marina ..	70728	273	19	8,612	5·16	444·4	350	Mature	406, 446, 443, 491	Clifford Farm Danny Boy
Everist, F. R., Tyabb, Red Poll (3).										
Chota Wallah Poppy ..	Vol. 12	273	12	4,512	4·31	194·3	310	Jr. 4	189, 193 ..	Northwood Rangi
Cypress Enid 3rd ..	Vol. 12	254	4	2,925	5·11	149·5	250	Sr. 2	.. ..	Burnwood Whistler
Cypress Penny	Vol. 12	253	4	3,793	4·80	182·0	230	Jr. 2	.. ..	Burnwood Whistler
Fairchild and Clutterbuck, Tinamba, Jersey (13).										
Rowallan Silvermine 4th ..	64128	273	N.C.K.	8,573	4·57	387·7	350	Mature	400, 436, 422, 365	Banyule Comet
Vaucluse Butterfly 2nd ..	89447	273	N.C.K.	5,712	6·10	348·7	250	Sr. 2	279 ..	Vaucluse Master 6th
Vaucluse Daphne 6th ..	89448	273	N.C.K.	7,205	5·15	371·4	270	Jr. 3	337 ..	Vaucluse Masterpiece
Vaucluse Duchess 5th ..	84384	273	N.C.K.	5,437	5·66	307·9	270	Jr. 3	.. ..	Vaucluse Masterpiece
Vaucluse Empress 7th ..	79405	273	N.C.K.	7,567	5·50	415·9	330	Sr. 4	298, 410, 383	Vaucluse Masterpiece
Vaucluse Flower 3rd ..	84385	273	N.C.K.	7,853	5·24	411·5	310	Jr. 4	374, 437 ..	Vaucluse Masterpiece
Vaucluse Free Girl 2nd ..	Vol. 31	273	N.C.K.	6,133	5·20	318·8	230	Jr. 2	.. ..	Vaucluse Masterpiece
Vaucluse Madrigal 2nd ..	84387	273	N.C.K.	6,913	5·51	381·0	350	Mature	462, 464 ..	Paisley Master
Vaucluse Marie Rose 2nd ..	84388	273	N.C.K.	7,358	5·59	411·0	310	Jr. 4	322, 461 ..	Vaucluse Masterpiece
Vaucluse Pansy 2nd ..	84390	273	N.C.K.	6,192	5·41	334·8	310	Jr. 4	347 ..	Vaucluse Masterpiece
Vaucluse Silvermine ..	Vol. 31	273	N.C.K.	6,291	5·73	360·5	230	Jr. 2	.. ..	Vaucluse Masterpiece
Vaucluse Tassel	89451	273	N.C.K.	6,393	5·30	338·7	250	Sr. 2	271 ..	Vaucluse Masterpiece
Vaucluse Tilly 2nd ..	Vol. 31	273	N.C.K.	9,058	4·47	404·9	350	Mature	319, 337, 373	Vaucluse Masterpiece

Name of Cow.	Herd Book No.	No. of Days in Test.	Milk last day of Test. lb.	Milk. lb.	Average Test.	Butter Fat. lb.	Standard required.	Class.	Previous Yields of Butter Fat.	Sire.
Fixter, A., Boisdale, Guernsey (2).										
Avonview Elaine ..	6728	273	17	7,839	5·49	430·1	350	Mature	307, 398, 404, 379	Kentdale Monogram
Avonview Enid	9871	273	15	7,526	4·55	342·2	270	Jr. 3	.. ..	Avonview Monogram 12th
Gay, R. G., and Son, Yarram, Jersey (4).										
Elm Grove Golden Silverbelle	86132	273	N.C.K.	5,766	5·52	318·0	290	Sr. 3	302 ..	Elm Grove Gold Star
Elm Grove Island Queen 4th	86133	273	N.C.K.	8,220	5·55	456·3	250	Sr. 2	398 ..	Mornmoot War Victor
Elm Grove Laurette 2nd ..	61465	273	N.C.K.	8,614	5·06	435·5	350	Mature	310, 501, 423, 544	Elm Grove Graceful Masterpiece
Elm Grove Veronica ..	86139	273	N.C.K.	7,550	5·30	399·8	270	Jr. 3	384 ..	Staghorn Clementine Noble 3rd
Grice, C. S., Somerville, Jersey (4).										
Glenoma Perree's Girl 2nd	86471	273	9	4,002	6·25	250·2	230	Jr. 2	.. ..	Banyule Camber
Glenoma Silvermine 2nd ..	86472	273	5½	4,287	5·73	245·5	230	Jr. 2	.. ..	Banyule Camber
Glenoma Weigelia ..	81513	273	6	4,263	6·23	265·6	270	Jr. 3	.. ..	Banyule Camber
Glenoma Weigelia 2nd ..	86474	273	4½	4,249	5·60	238·0	230	Jr. 2	.. ..	Banyule Camber
Hanbury, J. E. and Son, Toora, Jersey (1).										
Tooravale Princess 44th ..	89334	273	N.C.K.	6,892	6·10	420·6	270	Jr. 3	289 ..	Colyton Dandy's Aristocrat
Hardie, R. B., Lardner, Jersey (3).										
Dingley Dell Coral ..	66229	273	N.C.K.	9,154	4·30	393·3	350	Mature	.. ..	Clydevale Ventilation
Dingley Dell Prudence ..	71023	273	N.C.K.	11,166	4·07	454·1	350	Mature	.. ..	Clydevale Ventilation
Maxmount Brightness ..	82665	273	N.C.K.	8,705	5·49	478·2	310	Jr. 4	389, 314 ..	Maxmount Danny Boy
Hartley, C. G., Dandenong, Jersey (8).										
Avon Jasmine	74951	273	N.C.K.	5,077	6·02	305·4	350	Mature	438, 626, 710	Ruby's Beau (Imp.)
Belgonia Eileeen 8th ..	70227	273	N.C.K.	4,680	5·24	245·4	350	Mature	362, 397, 410	Aim High (Imp.)
Devon Glen Little Princess	Vol. 31	273	N.C.K.	5,294	5·90	312·2	270	Jr. 3	.. ..	Wonga Park Song King
Devon Glen Rosalie 2nd ..	Vol. 31	273	N.C.K.	4,409	5·43	239·5	270	Jr. 3	.. ..	Belgonia Esperanto
Selsey Great Lotus ..	Vol. 31	273	10	3,195	5·74	183·5	230	Jr. 2	.. ..	Selsey Great Prometheus
Warwick Samare's Design	89555	273	N.C.K.	5,795	4·95	287·0	270	Jr. 3	370 ..	Selsey Design's Foremost
Weir View Golden Design 2nd	59968	273	4½	4,919	4·95	243·4	350	Mature	323, 477, 473, 370, 425, 454	Weir View Golden Duke
Windrest Iris' Sunbeam ..	79659	273	N.C.K.	6,485	4·49	291·2	350	Mature	395, 567 ..	Windrest Airman
Harvey, T., Boisdale, Jersey (7).										
Jerseyholm Bluebell 38th ..	67185	240 (sold)	..	4,957	4·02	243·8	350	Mature	262, 241, 268, 355	Banyule Biplane
Jerseyholm Bluebell 53rd ..	71996	273	N.C.K.	7,727	5·09	393·2	290	Sr. 3	357 ..	Mornmoot Memnon 2nd
Jerseyholm Empress 64th ..	71968	273	N.C.K.	9,731	5·53	537·8	350	Mature	373, 458, 463	Orphanage Molly's Commander
Jerseyholm Empress 65th ..	71969	273	N.C.K.	7,677	4·84	371·5	350	Mature	233, 297, 364	Orphanage Molly's Commander
Jerseyholm Empress 85th ..	81965	273	N.C.K.	7,244	4·82	349·0	230	Jr. 2	.. ..	Mornmoot Memnon 2nd
Jerseyholm Lady Marge 23rd	76963	273	N.C.K.	6,796	4·08	338·2	290	Sr. 3	365 ..	Mornmoot Memnon 2nd
Jerseyholm Lady Marge 28th	86985	273	N.C.K.	6,341	5·48	347·4	230	Jr. 2	.. ..	Orphanage Zaffarine's Chief
Haywood, Dr. A. R., Hastings, Jersey (5).										
Anemone's Love (Imp.) ..	42695	273	22½	8,760	4·53	396·9	350	Mature	352, 428, 502, 336	Anemone's Lily Oxford
Glen Iris Royal Viola ..	71422	273	N.C.K.	10,059	5·73	576·6	350	Mature	323, 426, 495, 354	Glen Iris Royal Gallant
Windrest Chevy	42529	273	5½	6,863	5·21	358·0	350	Mature	251, 359, 289, 337, 413, 398, 427, 561, 567, 319	Edmonton Rarius
Windrest Chevy's Delight ..	79657	273	N.C.K.	6,780	6·12	414·8	350	Mature	473, 488, 312	Gadget (Imp.)
Windrest Dreaming Empress	89671	273	N.C.K.	9,918	4·84	479·9	290	Sr. 3	411 ..	Windrest Dreaming Pioneer
Hicks, E. J., Blains, Jersey (1).										
Leven Brae Ado Essie ..	67627	273	N.C.K.	8,693	4·85	422·0	350	Mature	477, 404 ..	Werribee Mikado
Higgins, J. A. A., Keysborough, Guernsey (1).										
Brighton Vale Marie ..	8371	273	19	6,009	5·13	308·2	310	Jr. 4	335 ..	Melbourne Alain D'Or
Hodgins, G. E., Hastings, Jersey (5).										
Verjean Voile	89460	273	18	6,509	4·93	321·0	230	Jr. 2	.. ..	Selsey Royal Chief
Verjean Vanity 2nd ..	74360	273	18	8,466	5·74	486·2	330	Sr. 4	287, 316, 361	Jorian Great Boy
Verjean Val	89454	273	16	5,874	4·80	281·9	230	Jr. 2	.. ..	Selsey Royal Chief
Verjean Valmai	Vol. 31	273	18	5,857	5·61	328·3	230	Jr. 2	.. ..	Selsey Royal Chief
Verjean Virtue	89458	180	4	2,940	4·51	132·6	230	Jr. 2	.. ..	Selsey Royal Chief

Name of Cow.	Herd Book No.	No. of Days in Test.	Milk last day of Test. lb.	Milk. lb.	Average Test.	Butter Fat. lb.	Standard required.	Class.	Previous Yields of Butter Fat.	Sire.
Hore, M. T., Horfield, Friesian (7).										
Elmar Flora	C.R.	273	N.C.K.	7,569	3·69	279·0	310	Jr. 4	308	Elmar Sylvia's Lad
Elmar Florence	C.R.	273	N.C.K.	13,248	2·86	379·2	350	Mature	762, 344	Elmar Sylvia's Lad
Elmar Iona Ideal	Vol. 15	273	N.C.K.	9,729	3·06	297·6	270	Jr. 3	..	Burnbank Iona Rock
Elmar Lassie	C.R.	273	N.C.K.	13,143	2·81	369·2	350	Mature	298, 381, 570, 459, 557	Elmar Sylvia's Lad
Elmar Sylvia Esme	C.R.	273	N.C.K.	7,151	3·09	221·1	270	Jr. 3	..	Burnbank Iona Rock
Elmar Trinette	C.R.	273	N.C.K.	7,293	3·11	226·9	230	Jr. 2	..	Elmar Majoe Galatea
Kelvale Maytime	C.R.	273	N.C.K.	10,236	3·75	384·3	290	Sr. 3	334	Kelvale Aristocrat
Huffer, J. A., Gormandale, Jersey (4).										
Glenvalley Coral Sand 6th	71543	273	N.C.K.	6,597	5·74	378·9	350	Mature	289, 301, 298, 332	Glenvalley Mercedes Chief
Glenvalley Gladys	86561	273	N.C.K.	9,348	4·99	466·4	330	Sr. 4	285, 369, 400	Yuleba Fancy Twylish 3rd
Glenvalley Handsome Girl 11th	Vol. 31	273	N.C.K.	5,057	6·60	334·0	230	Jr. 2	..	Glenvalley President
Glenvalley Waverley Lass 9th	76539	273	N.C.K.	8,499	5·63	478·1	330	Sr. 4	332, 418, 420	Yuleba Fancy Twylish 3rd
Hurrey, Estate of the late W. H., Koonwarra, Jersey (6).										
Kooreena Carrie 9th	67482	273	5½	3,542	5·96	211·0	350	Mature	381, 374, 355, 320	Kooreena Good Luck
Kooreena Lady 7th	62627	273	10	5,924	5·50	325·7	350	Mature	391, 394, 321, 409, 391	Kooreena Carrie 3rd's Halo
Kooreena Minerva 4th's Venus	67187	273	12½	6,278	5·70	358·0	350	Mature	304, 413, 388	Kooreena Handsome Lad
Kooreena Trinket 2nd	Vol. 31	273	8	3,339	6·23	208·0	230	Jr. 2	..	Kooreena Rover 3rd
Kooreena Yo Yo 8th	87295	273	8½	4,746	6·70	317·8	310	Jr. 4	326, 320	Kooreena Carrie 4th's Laddie
Kooreena Yo Yo 11th	Vol. 31	273	16½	5,472	5·35	292·9	250	Sr. 2	..	Kooreena Carrie 4th's Laddie
Jackson, H., Lockington, Jersey (3).										
Lockington Noella's Star	82500	273	N.C.K.	7,887	5·49	433·2	310	Jr. 4	433	Belgonia Mala
Pine Ridge Starette 4th	68655	273	N.C.K.	11,826	4·93	583·3	350	Mature	413	Duke of the Lake (Imp.)
Surrey Boronia 19th	79030	273	N.C.K.	8,078	5·47	441·6	310	Jr. 4	367	Surrey Lord Madeira
Johnson, F. G., Horsham, Jersey (2).										
Firebrace Fuchsia	Vol. 31	273	N.C.K.	4,265	5·09	217·1	230	Jr. 2	..	Orphanage Arthur
Firebrace Jean	Vol. 31	273	N.C.K.	3,429	5·11	175·1	230	Jr. 2	..	Brierwood Volunteer's Noble
Keele, H. A., Bamawm, Jersey (5).										
Waroin Dragonfly	69608	273	N.C.K.	8,294	5·35	443·8	350	Mature	450, 492	The Wattle's Gold Boy
Waroin Fly	69609	273	N.C.K.	8,151	5·68	462·6	350	Mature	436, 475	The Wattle's Gold Boy
Waroin Grasshopper 2nd	89530	273	N.C.K.	4,651	6·18	287·6	250	Sr. 2	..	Bamawm Peggy's Duke
Waroin Locust	74432	273	N.C.K.	7,382	5·50	405·9	350	Mature	313, 361	The Wattle's Gold Boy
Waroin Mosquito	69612	273	N.C.K.	7,197	5·74	412·9	350	Mature	378, 400	The Wattle's Gold Boy
Langlands, F. B., Horsham, Jersey (5).										
Brierwood Flower Girl 5th	65635	150	4	2,850	4·95	141·0	350	Mature	405, 370, 262	Murona Twylair
Brierwood Twylish Countess	75354	273	N.C.K.	5,889	5·00	294·3	290	Sr. 3	251, 334	Murona Twylair
Brierwood Vanity	70483	273	N.C.K.	6,294	5·15	324·0	350	Mature	312, 407, 332	Murona Twylair
Brierwood Vanity 3rd	85339	273	N.C.K.	6,813	5·13	349·6	270	Jr. 3	310	Orphanage Charger
Brierwood Volunteer Cowslip 2nd	Vol. 31	273	N.C.K.	3,561	5·62	200·0	270	Jr. 3	..	Murona Twylair
Lind, A. E., and Sons, Mount Taylor, Jersey (1).										
Sunny Dell Air Hostess	89071	273	12	6,218	5·55	345·0	270	Jr. 3	357	Banyule Mollison
Linke, H. P., Tarrington, Dairy Shorthorn (3).										
Corresdean Lila 2nd	1791E	273	17½	7,887	3·86	304·3	310	Jr. 4	255, 355	Drumneil Prince 3rd
Corresdean Snowy	1798E	240	4	7,110	3·13	223·6	350	Mature	376, 353	Willow Park Revenue 2nd
Drumneil Daisy 4th	1836E	273	21	8,198	3·66	300·3	350	Mature	288, 352, 203, 279	Willow Park Lustre 3rd
Longerenong Agricultural College, Dooen, Ayrshire (2).										
Longerenong Cootamundra Wattle 10th	33864	180	4	2,385	5·31	126·7	270	Jr. 3	..	Dookie Signet
Longerenong Lauristine 5th	33865	273	4	5,712	3·74	213·4	270	Jr. 3	205	Dookie Signet
Macaulay, C. W., Rochester, Jersey (3).										
Taranah Chime 5th	89147	273	N.C.K.	7,589	5·40	409·5	290	Sr. 3	297, 408	Werribee Twylish Master
Taranah Flora 8th	C.R.	210 (Sold)	..	3,675	5·99	220·1	230	Jr. 2	133	Five Gums King Lark
Taranah Floss 6th	84108	210 (Sold)	..	4,455	5·52	246·1	290	Sr. 3	260, 282	Werribee Twylish Master
McKenzie, Mrs. E. J., and Sons, Woodford, Jersey (1).										
Spring Valley Euphorbia 2nd	78921	273	15½	6,048	5·92	357·9	350	Mature	302, 319	Selsey Great Peer

Name of Cow.	Herd Book No.	No. of Days in Test.	Milk Last Day of Test. lb.	Milk. lb.	Average Test.	Butter Fat. lb.	Standard Required.	Class.	Previous Yields of Butter Fat.	Sire.
McNabb, G. A., and Son, Irrewillipe East, Jersey (5).										
Maxon Count's Primrose ..	72716	273	N.C.K.	6,441	5·41	348·3	350	Mature	325, 437, 456	Maxon Count Graceful
Maxon D's Favourite 2nd	82705	273	N.C.K.	7,734	5·01	387·8	270	Jr. 3	245 ..	Maxon Count Dawn
Maxon Handsome Favourite 4th	77631	273	N.C.K.	5,319	5·41	287·7	290	Sr. 3	293, 499 ..	Maxon Handsome Boy
Maxon Noble's Buttercup..	45068	273	N.C.K.	7,328	4·57	335·1	350	Mature	338, 430, 422, 530, 443, 316	Avalon Noble 8th
Maxon Noble's Goldfinch 2nd	54026	273	N.C.K.	5,043	5·50	277·4	350	mature	275, 393, 582, 447, 366	Avalon Noble 8th
Maher, R. H., Tongala, Jersey (27).										
Rosemont Daisy 9th ..	88807	273	28	6,137	5·59	342·8	270	Jr. 3	307 ..	Belgonia Aim High
Rosemont Duchess Fowler 5th	Vol. 31	90	4	1,305	5·62	73·3	230	Jr. 2	.. ..	Belgonia Aim High
Rosemont Jenny Lind 14th	73760	273	19½	6,569	5·29	347·8	350	Mature	260, 275, 302	Rosemont Volunteer
Rosemont Jenny Lind 23rd	88809	240	4	5,287	5·59	295·3	270	Jr. 3	230 ..	Belgonia Aim High
Rosemont Jenny Lind 26th	Vol. 31	273	16	5,840	4·81	281·0	230	Jr. 2	.. ..	Belgonia Perree
Rosemont Lady Fowler 30th	88810	273	19½	5,736	5·92	339·6	310	Jr. 4	274 ..	Belgonia Perree
Rosemont Lady Fowler 33rd	83727	273	24	7,557	5·48	414·4	310	Jr. 4	225 ..	Belgonia Perree
Rosemont Lady Fowler 46th	Vol. 31	273	13	4,036	5·39	217·6	230	Jr. 2	.. ..	Belgonia Aim High
Rosemont Lady Fowler 47th	Vol. 31	273	15	3,908	6·29	245·9	230	Jr. 2	.. ..	Belgonia Aim High
Rosemont Lady Fowler 50th	Vol. 31	273	20	5,250	5·56	290·0	230	Jr. 2	.. ..	Rosemont Perree's Maginot
Rosemont Lady Fowler 51st	Vol. 31	273	15	4,427	5·53	245·0	230	Jr. 2	.. ..	Rosemont Perree's Maginot
Rosemont Lady Fowler 52nd	Vol. 31	273	14	5,392	5·23	282·0	230	Jr. 2	.. ..	Rosemont Perree's Maginot
Rosemont Lassie Fowler 20th	83730	273	17	7,179	5·58	400·3	350	Mature	287, 357 ..	Belgonia Perree
Rosemont Lassie Fowler 28th	Vol. 31	273	21	5,649	5·68	321·1	230	Jr. 2	.. ..	Belgonia Perree
Rosemont Laura 7th ..	50461	273	17½	6,855	5·10	349·3	350	Mature	247, 311, 315, 284, 335	Rosemont Laddie Fowler 3rd
Rosemont Laura 15th ..	Vol. 31	273	18	5,176	5·21	269·7	230	Jr. 2	.. ..	Belgonia Perree
Rosemont Laura 16th ..	Vol. 31	273	19	5,892	4·87	287·2	230	Jr. 2	.. ..	Belgonia Aim High
Rosemont Primrose 7th ..	73764	273	18	8,409	5·35	449·7	350	Mature	341,465 ..	Rosemont Laddie Fowler 3rd
Rosemont Primrose 9th ..	78716	273	28	9,330	5·15	480·2	350	Mature	353, 404 ..	Belgonia Perree
Rosemont Primrose 13th ..	Vol. 31	273	20½	6,152	5·38	331·1	230	Jr. 2	.. ..	Belgonia Aim High
Rosemont Primrose 14th ..	Vol. 31	273	13½	6,318	4·86	307·1	230	Jr. 2	.. ..	Belgonia Aim High
Rosemont Silvermine 12th	73767	180	4	5,160	4·54	234·4	350	Mature	337 ..	Belgonia Perree
Rosemont Silvermine 20th	88817	273	20½	7,052	4·04	348·1	290	Sr. 3	277 ..	Belgonia Perree
Rosemont Silvermine 21st	83741	273	20	6,782	5·04	342·1	290	Sr. 3	252 ..	Belgonia Aim High
Rosemont Silvermine 22nd	88818	273	17½	6,338	5·63	356·8	270	Jr. 3	.. ..	Belgonia Aim High
Rosemont Silvermine 25th	Vol. 31	273	22	6,276	5·24	329·0	230	Jr. 2	.. ..	Belgonia Perree
Rosemont Silvermine 26th	Vol. 31	273	15	4,397	5·03	260·8	230	Jr. 2	.. ..	Rosemont Perree's Maginot
Masters, S. H., and Son, Murraydale, Jersey (2).										
Rutland Brunette 16th ..	64153	273	21	9,705	5·34	518·0	350	Mature	363, 454, 521, 624, 618, 518	King's Vale Lauder
Rutland Brunette 20th ..	69028	273	14	8,280	6·09	504·0	350	Mature	390, 481, 534, 508	Selsey Fashion Boy
Meaklim Bros., Mooroopna, Dairy Shorthorn (11).										
Drumneil Angel	C.C.	273	16	6,482	3·33	215·8	230	Jr. 2	.. ..	Drumneil Comet
Drumneil Daisy 3rd ..	1835E	273	9½	10,094	3·80	383·5	350	Mature	320, 323, 353, 404	Willow Park Lustre 3rd
Drumneil Fairy 6th ..	1842E	273	7½	9,293	3·61	335·7	350	Mature	299, 298, 339	Willow Park Lustre 3rd
Drumneil Ida 5th ..	C.C.	273	15½	7,940	3·60	285·9	230	Jr. 2	.. ..	Willow Park Barrington 46th
Drumneil Lily	775E	273	22	9,388	3·40	319·1	350	Mature	423, 474, 437, 530, 551, 440	Willow Park Reformer
Drumneil Nellie 6th ..	1849E	273	35	12,540	3·67	459·7	350	Mature	320, 300, 437	Willow Park Lustre 3rd
Drumneil Pearl 3rd ..	1850E	273	17	9,681	3·77	364·8	350	Mature	315, 329 ..	Willow Park Lustre 3rd
Drumneil Princess 6th ..	1853E	240	4	8,250	3·96	326·9	350	Mature	325, 227, 341, 396	Willow Park Lustre 3rd
Drumneil Princess 7th ..	1854E	273	18½	10,590	3·86	409·2	350	Mature	314, 371, 388, 410	Willow Park Lustre 3rd
Drumneil Princess 10th ..	C.C.	273	22	7,491	4·22	316·2	230	Jr. 2	.. ..	Drumneil Comet
Drumneil Rosebud ..	C.C.	273	27	11,721	3·16	369·9	270	Jr. 3	280 ..	Willow Park Barrington 46th
Methodist Central Mission, Lilydale, Guernsey (3).										
Melbourne Anemone ..	7397	273	16	6,920	4·71	325·8	350	Mature	174, 292, 428	Yarraview Sequel's Slogan
Melbourne Lucille ..	7445	273	16	8,105	4·50	364·7	350	Mature	192, 263, 380, 287	Yarraview Sequel's Slogan
Tally Ho Golden Locks ..	11652	273	14	6,636	4·99	331·3	290	Sr. 3	285, 270 ..	Yarraview Fakir
Moore, J., and Co., Yarram, Jersey (2).										
Tooloonook Peach 22nd ..	C.R.	240	4	4,095	4·82	197·5	230	Jr. 2	.. ..	Belgonia Junette 2nd's Design
Tooloonook Verbena 13th	89320	273	N.C.K.	2,864	5·18	148·4	230	Jr. 2	.. ..	Belgonia Junette 2nd's Design

Name of Cow.	Herd Book No.	No. of Days in Test.	Milk Last Day of Test. lb.	Milk. lb.	Average Test.	Butter Fat. lb.	Standard Required.	Class.	Previous Yields of Butter Fat.	Sire.
Nancarrow Bros., Kerang, Jersey (1).										
Pine Ridge Lady 2nd ..	83472	273	N.C.K.	8,207	5·48	449·8	270	Jr. 3	325 ..	Belgonia Peggy 9ths King
Nicholas, M. A., Sherbrooke, Jersey (3).										
Brampton Champion's Girl (Imp.)	56039	273	14	7,650	4·90	374·7	350	Mature	457, 398, 316, 206	Brampton Son of Champions
Selsey Great Clementine ..	64220	273	13	6,513	6·59	429·1	350	Mature	338, 350, 447, 414, 328	Brampton Great Boy (Imp.)
Selsey Princess Wyandotte	64223	273	18	5,979	5·45	325·8	350	Mature	382, 390, 421, 384, 338	Brampton Great Boy (Imp.)
Nicholson, A. N., Moorooduc, Illawarra Shorthorn (2).										
Devondale Buttercup 12th	Vol. 9	273	20	6,870	4·46	306·3	310	Jr. 4	274 ..	Devondale Guardsman
Devondale Plum 3rd ..	Vol. 9	273	9	6,807	3·67	249·7	310	Jr. 4	265 ..	Devondale Guardsman
Noonan, G., Benalla, Jersey (3).										
Keyuga Beauty	53544	273	4½	5,534	5·14	284·4	350	Mature	317, 298, 262	Keyuga Bold Pilot
Noonavale Lady Fowler ..	88266	240	4	4,365	5·58	243·4	270	Jr. 3	234 ..	Belgonia Perree
The Wattles Petal 11th ..	84195	273	17	5,706	5·16	294·4	270	Jr. 3	403 ..	Belgonia Design's Aim
O'Neill, J., Echuca Village, Jersey (4).										
Ullina Dorothy	84339	273	18	7,587	6·14	466·0	310	Jr. 4	326, 413 ..	Mornmoot Satisfaction's Warrior
Ullina Fancy's Queen ..	69476	273	8	6,977	5·88	409·9	350	Mature	307, 393, 415, 433, 465	Ballara Fancy King
Ullina Madeira's Milkmaid	Vol. 31	273	18	5,948	5·23	313·9	230	Jr. 2	.. ..	Mornmoot Madeira's Viceroy
Ullina Yvonne	74313	273	8½	6,561	5·48	359·5	350	Mature	332, 382, 334, 357	Ballara Fancy King
Parker, L. M., Tallarook, Dairy Shorthorn (7).										
Deep Dale Dainty 2nd ..	C.C.	273	19	6,027	3·67	221·3	230	Jr. 2	.. ..	Willow Park Imperial Cran 34th
Deep Dale Gem	11811E	273	15	7,140	3·88	277·2	350	Mature	324, 381, 346	Willow Park Banker 3rd
Deep Dale Lucy 3rd ..	C.C.	273	15½	5,574	3·67	204·7	230	Jr. 2	.. ..	Willow Park Imperial Cran 34th
Deep Dale Peach 2nd ..	C.C.	273	13½	7,473	3·85	287·9	290	Sr. 3	207 ..	Willow Park Barrington 26th
Deep Dale Pearl 2nd ..	C.C.	273	15	7,659	3·53	270·2	290	Sr. 3	219 ..	Willow Park Barrington 26th
Deep Dale Polly 2nd ..	C.C.	273	9	7,233	3·83	276·8	350	Mature	295, 355 ..	Willow Park Barrington 26th
Deep Dale Tulip 2nd ..	C.C.	273	15½	5,265	3·40	178·8	230	Jr. 2	.. ..	Willow Park Imperial Cran 34th
Parkes, E. F., Trafalgar, Jersey (2).										
Irona Dreaming Cowslip ..	71881	240	4	5,489	4·17	229·1	350	Mature	263, 224, 226, 192	Dreamer's Hamptonne Star (Imp.)
Irona Janet	86909	210	4	3,330	5·10	169·7	250	Sr. 2	151 ..	Irona Dreamer
Pattison, G., Tongala, Ayrshire (1).										
Willow Park Jeanette ..	31007	273	10	7,875	4·40	346·6	350	Mature	343, 393, 367, 343, 345, 419	Tulham Beam
Payne, A. E. T., Lilydale, Guernsey (7).										
Yarraview Calm	11954	273	22	7,413	5·23	387·9	250	Sr. 2	373 ..	Honoria's Benefactor (Imp.)
Yarraview Ceres 2nd ..	11955	273	25½	8,402	5·06	425·3	270	Jr. 3	362 ..	Honoria's Benefactor (Imp.)
Yarraview Chamois ..	9762	273	28½	10,623	5·58	592·5	310	Jr. 4	420, 557 ..	Yarraview Factor
Yarraview Le Mode ..	8225	273	42½	14,813	6·50	963·4	350	Mature	563, 738, 816, 976	Camilla's Majestic 3rd of Maple Lodge (Imp.)
Yarraview Rovetta ..	11980	273	14½	6,435	4·94	318·1	250	Sr. 2	347 ..	Honoria's Benefactor (Imp.)
Yarraview Rouleau ..	11978	273	31	8,823	4·57	403·4	230	Jr. 2	.. ..	Yarraview Sovereign
Yarraview Vivid	11988	273	20	6,033	5·20	313·6	230	Jr. 2	.. ..	Yarraview Earl
Phillips, J. H., Swan Hill, Jersey (2).										
Ryelands Stylish Dainty ..	Vol. 31	273	21	7,262	5·12	371·6	230	Jr. 2	.. ..	Pine Ridge Stylish
Ryelands Sunflower ..	Vol. 31	273	16½	6,501	4·89	317·7	230	Jr. 2	.. ..	Pine Ridge Stylish
Powell, T. S., Mansfield, Jersey (1).										
Carellen Fancy Madeira ..	80672	273	8	4,608	6·11	281·7	250	Sr. 2	289 ..	Werribee Planet
Read, Estate of the late J. D., Springhurst Jersey (3).										
Springhurst Napoleonette Tomato	78936	273	15	6,295	6·15	387·1	290	Sr. 3	421 ..	Springhurst Tomato's Pride
Springhurst Socurette Yarran	73932	273	5	6,075	5·13	311·6	310	Jr. 4	410, 355 ..	Bellefaire Superlative Pride
Springhurst Successor's Narcissus	73933	273	20	8,163	4·71	384·1	330	Sr. 4	370, 360 ..	Springhurst Glad Successor

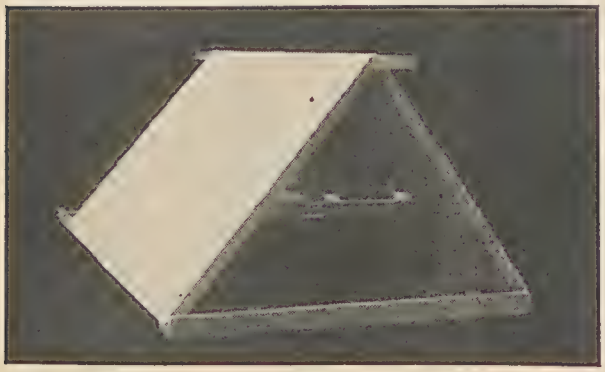
Name of Cow.	Herd Book No.	No. of Days in Test.	Milk Last Day of Test. lb.	Milk. lb.	Average Test.	Butter Fat. lb.	Standard Required.	Class.	Previous Yields of Butter Fat.	Sire.
Reid, Miss B. B., Bundoora, Jersey (7).										
Jubilee Bramble	87024	240 (Sold)	..	4,155	4·92	204·6	270	Jr. 3	240 ..	Werribee Stylish Masterpiece
Jubilee Lavandula ..	72012	273	5	4,005	4·58	183·4	350	Mature	205, 224 ..	Werribee Stylish Masterpiece
Jubilee Lillipilli	67239	273	15	5,145	4·96	255·3	350	Mature	287, 201 ..	Werribee Stylish Masterpiece
Jubilee Lupin 2nd ..	Vol 31	273	15½	4,127	4·98	205·6	230	Jr. 2	.. ..	Jubilee Richlight
Jubilee Walnut	57878	273	13	5,331	4·83	257·5	350	Mature	340, 281 ..	Jubilee Whalelight
Jubilee Whitlavia ..	87035	273	6	2,987	5·04	150·5	270	Jr. 3	184 ..	Jubilee Landlight
Jubilee Wivelsfield ..	87037	273	8	3,834	4·69	180·8	270	Jr. 3	184 ..	Jubilee Richlight
Richardson, W. S., Bacchus Marsh, Jersey (4).										
Gladfield Princess Kitty ..	61677	273	14	4,780	5·04	240·7	350	Mature	205, 302, 304, 294	Grangelea Dandy Mac
Neerod Bright Eyes ..	73101	273	13½	4,046	6·05	244·7	350	Mature	358, 359 ..	Mornmoot Montrose
Sutton Lea Damsel ..	Vol. 31	273	11	3,618	4·78	172·9	230	Jr. 2	.. ..	Crendon Royal Duke
Willis Vale Colonel's Pansy	64921	273	10½	4,592	4·67	214·6	350	Mature	323, 355, 290	Willis Vale Mystic Colonel
Ronalds, O. and Son, Tarago, Jersey (2).										
Jindivick Clementine 2nd ..	Vol. 31	273	N.C.K.	7,490	5·04	377·5	230	Jr. 2	.. ..	Mornmoot Meteor
Jindivick Heroine 8th ..	57868	273	N.C.K.	11,072	4·39	485·9	350	Mature	440, 450, 414, 532, 595, 589	Somerville Master Babs
Ross, D. M., Croydon, Dairy Shorthorn (7).										
Willow Park Camelia 36th	2040E	273	13	7,949	3·36	266·9	310	Jr. 4	314 ..	Willow Park Imperial Cran 18th
Willow Park Camelia 39th	1507C	273	25	8,820	2·90	255·4	290	Sr. 3	257 ..	Anderson Imperial Cran 6th (Imp.)
Willow Park Countess 35th	1512C	273	11	7,086	3·37	238·8	330	Sr. 4	320, 286 ..	Anderson Imperial Cran 6th (Imp.)
Willow Park Dainty 16th..	1518C	273	10	7,365	3·52	259·2	350	Mature	271, 355, 264	Anderson Imperial Cran 6th (Imp.)
Willow Park Duchess 46th	1527C	273	14½	6,359	3·71	235·9	310	Jr. 4	275 ..	Anderson Imperial Cran 6th (Imp.)
Willow Park Duchess 53rd	C.C	273	13	6,686	3·86	259·8	270	Jr. 3	228 ..	Willow Park Imperial Cran 34th
Trevanin Park Clarabelle ..	C.C.	248	4	5,996	3·57	214·0	270	Jr. 3	230 ..	Willow Park Barrington 21st
St. Joseph's Home, Sebastopol, Jersey (4).										
Belgonia Lady Capture ..	70236	240	4	3,877	4·24	164·3	350	Mature	272, 299, 386, 289	Design's Ruler (Imp.)
St. Joseph's Buttercup 2nd	C.R.	273	11	4,476	6·54	292·7	270	Jr. 3	258 ..	Marfield Joker
St. Joseph's Design's Patricia	Vol. 31	273	10	4,877	5·19	253·2	310	Jr. 4	326, 212 ..	Selsey Design's Standard
St. Joseph's Duke's Lady ..	Vol. 31	273	14	5,909	5·48	323·9	270	Jr. 3	277 ..	Marfield Joker
Shearman, A. and W., Darnum, Jersey (3).										
Darnum Park Eminence's Finesse	Vol. 31	273	16½	6,050	5·02	303·9	310	Jr. 4	351 ..	Gen Iris Finesse Oxford
Darnum Park Molly's Attraction	C.R.	273	16½	7,017	5·39	378·4	350	Mature	356 ..	Darnum Park Lord Starbright 2nd
Darnum Park Princess 5th	Vol. 31	273	12	4,715	5·90	278·3	230	Jr. 2	.. ..	Darnum Park Lord Starbright 2nd
Smith Bros., Mirboo North, Jersey (7).										
Sylvan Hill Bluebell ..	50735	210	4	4,237	4·85	205·3	350	Mature	345, 321, 405, 396, 347, 347, 412, 337	Somerville Heir Apparent
Sylvan Hill Duchess ..	50736	273	N.C.K.	6,342	5·07	321·6	350	Mature	409, 305, 427, 511, 413, 489, 436, 414, 432	Somerville Heir Apparent
Sylvan Hill Charm 2nd ..	74045	273	N.C.K.	7,160	5·47	391·6	350	Mature	296, 315, 332, 360	Glen Iris Bow Bells
Sylvan Hill Gaypiece ..	69186	210 (Sold)	..	5,625	4·47	251·2	350	Mature	266, 332, 268, 301, 278	Glen Iris Bow Bells
Sylvan Hill Handsome Belle 2nd	79054	273	N.C.K.	6,620	6·11	404·2	350	Mature	332, 301, 358	Glen Iris Bow Bells
Sylvan Hill Mercedes ..	79057	273	N.C.K.	6,774	4·94	334·9	350	Mature	156, 185, 226	Glen Iris Bow Bells
Sylvan Hill Sunlight 2nd ..	89118	273	N.C.K.	4,838	4·89	236·6	270	Jr. 3	230 ..	Werribee Viceroy
Smith, R. W., and Son, Koo-wee-rup, Friesian (13).										
Homeleigh 252	Vol. 15	273	27	9,099	3·27	297·5	230	Jr. 2	.. ..	Kelvale Democrat
Homeleigh Janice ..	Vol. 15	273	35	13,203	3·15	415·7	310	Jr. 4	.. ..	Homeleigh Blackwell
Warwick Maggie Woodcrest	Vol. 15	273	40½	17,497	3·24	567·6	350	Mature	265, 352, 394, 636, 586, 557, 818	Greenvale Woodcrest Oakwood 2nd
Warwick Mona Patch ..	C.R.	273	22	8,953	2·86	255·7	230	Jr. 2	.. ..	Elmar Iona Patch
Wattle Bank Caroline ..	Vol. 15	273	6	7,143	2·65	189·4	270	Jr. 3	249 ..	Wattle Bank Oakview Segis

Name of Cow.	Herd Book No.	No. of Days in Test.	Milk Last Day of Test. lb.	Milk. lb.	Average Test.	Butter Fat. lb.	Standard Required.	Class.	Previous Yields of Butter Fat.	Sire.
Smith, R. W., and Son, Koo-wee-rup, Friesian—*continued.*										
Wattle Bank Colantha Maggie	Vol. 15	273	14	9,552	2·83	270·6	250	Sr. 2	292 ..	Elmar Iona Patch
Wattle Bank Felicity ..	Vol. 15	273	15	8,890	3·07	273·2	230	Jr. 2	.. ..	Wattle Bank Oakview Segis
Wattle Bank Flora ..	Vol. 15	273	31	12,111	2·69	325·3	230	Jr. 2	.. ..	Wattle Bank Oakview Segis
Wattle Bank Mercedes Queen	6114	273	9	13,124	2·94	386·2	350	Mature	329, 408, 414, 389	Hengest Lizzie Segis
Wattle Bank Primrose 4th	Vol. 15	273	18	11,167	2·68	298·9	350	Mature	455, 444, 448	Wattle Bank Segis De Kol
Wattle Bank Segis Jessie ..	6123	273	23	11,301	3·00	339·5	350	Mature	427, 490, 428, 403	Hengest Lizzie Segis
Wattle Bank Segis Maggie	C.R.	273	20	8,585	3·14	269·8	230	Jr. 2	.. ..	Wattle Bank Segis De Kol
Wattle Bank Tulip ..	Vol. 15	273	12	8,724	3·35	292·3	310	Jr. 4	315, 273 ..	Wattle Bank Oakview Segis
Stephens, Dr. F. G., Vermont, Guernsey (3).										
Bangalow Vale Fairy ..	3975	273	24½	8,969	4·07	445·5	350	Mature	332, 356, 341, 408, 443, 404, 399, 429	Melbourne Sequel Slogan
Roads End Dannielle ..	11376	273	16	7,160	4·55	325·5	270	Jr. 3	.. ..	Vermont Melford
Vermont Henrietta ..	9561	273	16	9,501	4·66	442·9	350	Mature	164, 274, 330, 453	Roads End Henri
Tandberg, G., and Son, Warragul, Friesian (2).										
Bolero Sylvia Mary ..	5296	273	N.C.K.	10,672	2·79	297·3	350	Mature	311, 272, 327	Winlaton Pioneer
Douglas Vale Lady Sylvia	Vol. 15	273	N.C.K.	5,927	3·21	190·2	230	Jr. 2	.. ..	Kelvale Majoe Master
Tandberg, G., and Son, Warragul, Illawarra Shorthorn (4).										
Donrobin Bangle ..	10268	210	4	5,160	3·49	180·2	350	Mature	326, 222 ..	Premier 2nd of Kurrawong
Myrtleville Dora 3rd ..	Vol. 9	273	N.C.K.	6,182	3·87	239·2	270	Jr. 3	271 ..	Parkview Combination
Myrtleville Merle ..	Vol. 9	210	4	5,595	3·59	200·7	350	Mature	352, 236 ..	Greyleigh Seabright
Veresdale Bush Bee ..	Vol. 9	240	4	7,462	3·56	265·6	350	Mature	264, 532, 372, 289	Ovensdale Pearl's Renown
Teychenne and Ducret, Wesburn, Guernsey (3).										
Meadow Vale Jillian ..	10874	273	N.C.K.	4,413	5·92	261·2	230	Jr. 2	.. ..	Yarraview Marvel
Meadow Vale Trinket ..	10880	273	N.C.K.	6,186	5·40	334·2	250	Sr. 2	330 ..	Yarraview Marvel
Warrawong Warrena ..	8038	273	N.C.K.	8,848	5·43	480·6	350	Mature	437, 449 ..	Nundorah Climax
Tomasetti, B. G., Drouin West, Ayrshire (6).										
Alvaston Audrey ..	31922	273	16½	8,165	4·04	329·8	350	Mature	203, 284, 303, 338, 343	Cathcart Masterpiece
Glencorren Greta ..	35440	273	N.C.K.	9,025	4·55	410·2	270	Jr. 3	315 ..	Glencorren Future
Glencorren Marietta ..	C.R.	273	N.C.K.	7,533	4·19	315·7	230	Jr. 2	.. ..	Glencorren Future
Glencorren Miracle ..	C.R.	240 (Sold)	..	4,222	3·97	167·8	230	Jr. 2	.. ..	Glenfalloch Pilot
Glencorren Myra ..	C.R.	273	N.C.K.	9,981	3·79	378·6	270	Jr. 3	232 ..	Glenfalloch Pilot
Scotswood Golden Gleam 4th	35851	273	N.C.K.	6,695	4·32	289·1	230	Jr. 2	.. ..	Scotswood Gallant 2nd
Trevaskis, F. T., Tongala, Jersey (1).										
Ballara Marie	85017	273	9	4,999	5·61	280·4	230	Jr. 2	.. ..	Glen Iris Violettes Oxford
Tyssen, C. J., Warragul, Jersey (2).										
Hylsbroke Gold Dust ..	57734	273	7	8,802	4·49	394·8	350	Mature	467, 453, 405	Latrobe Starjoy
Hylsbroke Rosemary ..	76884	273	25	7,469	4·81	359·1	330	Sr. 4	285, 326, 333	The Wattles Young Gamboge
Unthank, Miss Freda, Hastings, Jersey (3).										
The Hollies Pearl ..	84151	273	N.C.K.	5,618	4·64	260·8	350	Mature	527, 320 ..	St. John's Jewel 3rd's Investor
The Hollies Queen 7th ..	C.R.	273	14½	4,724	6·23	294·5	230	Jr. 2	.. ..	Windrest Rance's Lad
The Hollies Seaweed 3rd ..	84153	240	4	5,055	4·69	237·1	310	Jr. 4	250, 272 ..	The Hollies Chief
Vaughan Bros., Girgarre, Jersey (10).										
Lynroy Coral	C.R.	273	N.C.K.	6,173	5·48	338·5	310	Jr. 4	262, 450 ..	Werribee Laverock
Lynroy Fay	67740	273	N.C.K.	6,843	5·18	354·3	350	Mature	283, 443, 426, 392, 298	Werribee Laverock
Lynroy Heatherbelle ..	Vol. 31	273	N.C.K.	8,139	5·18	421·6	290	Sr. 3	380 ..	Werribee Laverock
Lynroy Mona	87575	273	N.C.K.	8,672	5·39	467·4	310	Jr. 4	484, 435 ..	Werribee Laverock
Lynroy Nancy Belle 3rd ..	87576	273	N.C.K.	4,914	6·04	296·7	250	Sr. 2	274 ..	Lynroy Pixie's Prince
Lynroy Nectar	C.R.	273	N.C.K.	6,585	5·89	387·7	310	Jr. 4	349 ..	Carellen Madeira's Pride
Lynroy Princess Natty ..	82558	273	N.C.K.	7,682	5·82	447·4	310	Jr. 4	363 ..	Werribee Laverock
Lynroy Sunflower ..	Vol. 31	273	N.C.K.	5,952	5·84	347·5	230	Jr. 2	.. ..	Carellen Madeira's Pride
Lynroy Vanity Fair ..	82559	273	N.C.K.	9,120	5·14	469·1	310	Jr. 4	376, 371 ..	Werribee Laverock
Lynroy Wee Pix ..	C.R.	273	N.C.K.	5,190	6·35	329·4	310	Jr. 4	299 ..	Carellen Madeira's Pride
Wade, G. F., Stratford, Jersey (5).										
Avon Dianthus	80039	273	N.C.K.	6,123	5·45	333·8	350	Mature	303, 415, 403	Avon Ruby's Count
Avon Felicity	C.R.	273	N.C.K.	4,307	6·09	262·1	290	Sr. 3	199 ..	Studleigh Lord Madeira
Inverbroom Empress' Antoinette	71869	273	N.C.K.	8,883	5·64	500·6	330	Sr. 4	328, 377 ..	Inverbroom Marie's Chief
Inverbroom Ruby's Eminent	81877	273	N.C.K.	6,734	5·22	351·2	270	Jr. 3	302 ..	Clarendon Eyre Eminent's Boomerang 4th
Pine Lodge Bright Star ..	C.R.	273	N.C.K.	5,105	5·05	257·9	230	Jr. 2	.. ..	Melrose Island King

Name of Cow.	Herd Book No.	No. of Days in Test.	Milk last day of Test. lb.	Milk. lb.	Average Test.	Butter Fat. lb.	Standard required.	Class.	Previous Yields of Butter Fat.	Sire.
Walker, C. S., Swan Hill, Jersey (2).										
Warwick Cream Stockings 14th	Vol. 31	30	4	870	4·70	40·9	230	Jr. 2	.. ..	Navua Wonderful Star
Warwick Polly 25th ..	Vol. 31	210	4	3,705	5·73	212·4	230	Jr. 2	.. ..	Selsey Design's Foremost
Waterhouse, H. W., and Son, Pakenham, Jersey (11).										
Navuloa La Stralia ..	68277	273	20	9,474	4·78	453·3	350	Mature	380, 448, 430, 457	Staghorn Laburnum's Masterpiece
Navuloa La Wyandotte ..	73098	273	17½	7,824	4·71	368·2	350	Mature	335, 380, 387	Staghorn Laburnum's Masterpiece
Navuloa Laburnum's Lady	83100	273	28	7,734	4·75	367·4	270	Jr. 3	250 ..	Staghorn Laburnum's Masterpiece
Navuloa Magnet's Princess	88154	273	8	5,537	4·85	268·4	230	Jr. 2	.. ..	Navuloa Magnet's Grandmaster
Navuloa Master's Madge ..	58686	273	18	7,317	5·27	385·6	350	Mature	468, 446, 411, 385	Werribee Grandmaster
Navuloa Master's Magnet	49805	250 (Sold)	..	7,897	4·59	362·4	350	Mature	515, 465, 395, 333	Werribee Grandmaster
Navuloa Royal Lady ..	88160	273	20	6,585	5·22	343·6	230	Jr. 2	.. ..	Ovalau Magnet's King
Navuloa Royal Lass ..	88161	273	22	8,141	5·25	427·6	230	Jr. 2	.. ..	Ovalau Magnet's King
Ovalau Magnetic ..	78274	273	17½	8,880	4·96	440·4	310	Jr. 4	356, 353 ..	Staghorn Laburnum's Masterpiece
Ovalau Magnolio ..	88390	210 (Sold)	..	5,805	4·99	289·7	230	Jr. 2	.. ..	Ovalau Magnet's King
Ovalau Queen	88392	273	16	6,494	4·94	320·6	230	Jr. 2	.. ..	Ovalau Magnet's King
Whelpton, B., Whittlesea, Jersey (8).										
Crystal Brook Bloom ..	47798	240	4	4,995	4·70	234·9	350	Mature	486, 430, 386	Crystal Brook Noble
Eulomo Centurion's Duchess	C.R.	273	15	6,620	4·92	326·0	310	Jr. 4	398 ..	Werribee Centurion
Hemswell Aldan's Duchess	C.R.	273	11	3,963	4·91	194·5	230	Jr. 2	.. ..	Eulomo Prince Aldan
Hemswell Janice ..	C.R.	273	14	6,102	4·46	272·3	310	Jr. 4	284 ..	Clarendon Eyre Eminent's Moon 2nd
Neerod Buttercup 2nd ..	Vol. 31	273	9	5,310	5·74	304·6	230	Jr. 2	.. ..	Neerod Braces
Neerod Butter Girl ..	83105	273	18	4,731	5·64	266·9	270	Jr. 3	321 ..	Neerod Braces
Willis Vale Colonel's Milkmaid	84576	180	4	3,150	6·32	199·2	230	Jr. 2	.. ..	Willow Vale Mystic Colonel
Willis Vale Pilot's Boronia	74548	273	16	5,097	4·92	250·6	250	Sr. 2	.. ..	Willis Vale Prince Pilot
Williams, Estate of the late F. A., Bamawm Extension, Jersey (8).										
Bamawm Bonnie Lass 2nd	60470	273	N.C.K.	11,588	6·03	698·6	350	Mature	393, 552, 750, 650	Bamawm Leon
Bamawm Maderia Gem ..	C.R.	210 (Sold)	..	2,617	7·25	189·7	230	Jr. 2	.. ..	Bamawm Madeira Masterpiece
Bamawm Madeira Rosalie	85066	273	N.C.K.	5,897	5·61	330·9	250	Sr. 2	269 ..	Mornmoot War Hero
Bamawm Miss Muffet ..	65321	273	N.C.K.	7,727	4·61	356·3	350	Mature	298, 492, 400	Bamawm Bonnie Boy
Bamawm Peggy's Madeira	85067	273	N.C.K.	8,376	5·65	473·3	250	Sr. 2	428 ..	Mornmoot War Hero
Bamawm Princess Noella ..	65323	273	N.C.K.	7,293	5·14	374·8	350	Mature	328, 472, 391, 438, 374	Bamawm Master Gaypiece
Bamawm Princess Noella 2nd	85070	273	N.C.K.	8,486	5·97	506·4	270	Jr. 3	409 ..	Mornmoot War Hero
Bamawm Ruth	60474	273	N.C.K.	9,270	4·62	428·5	350	Mature	402, 492, 526, 535, 476, 467	Bamawm Leon
Wilson, A., Port Fairy North, Ayrshire (16).										
Jennewar Pearline ..	32628	210	4	3,630	3·46	125·5	350	Mature	228, 233, 140	Denbigh Ace
Lough View Balm ..	33866	210	4	4,117	5·07	208·9	350	Mature	266, 194 ..	Carracoorte Bobby
Lough View Balm 3rd ..	35680	273	9	4,619	4·99	230·4	270	Jr. 3	207 ..	Lough View Bell Lad
Lough View Beauty 5th ..	Vol. 36	273	8	3,971	4·79	190·4	230	Jr. 2	.. ..	Lough View Bell Lad
Lough View Bellona ..	32777	273	6	6,138	3·43	210·5	350	Mature	243, 304 ..	Carracoorte Bobby
Lough View Bellona 2nd ..	34858	273	8	6,352	4·20	266·9	350	Mature	199, 242 ..	Carracoorte Bobby
Lough View Blanche 4th ..	Vol. 36	273	9	3,435	4·62	158·8	230	Jr. 2	.. ..	Lough View Bell Lad
Lough View Brownie ..	32778	273	9	6,030	4·25	256·0	350	Mature	196, 289, 227	Carracoorte Bobby
Lough View Bunty 2nd ..	Vol. 36	273	14	5,595	4·04	226·3	230	Jr. 2	.. ..	Lough View Bell Lad
Lough View Fairy ..	35683	273	13	5,952	3·91	232·8	270	Jr. 3	173 ..	Lough View Bell Lad
Lough View Loretta ..	31861	273	7	5,949	3·83	227·8	310	Jr. 4	207, 221 ..	Lough View Bernard
Lough View Music 7th ..	Vol. 36	273	14	4,634	4·51	209·2	230	Jr. 2	.. ..	Lough View Victor
Lough View Petunia 2nd ..	33869	273	15	7,500	3·89	291·8	350	Mature	266, 310 ..	Carracoorte Bobby
Lough View Rosebloom 2nd	35686	273	8	4,264	4·81	205·2	270	Jr. 3	171 ..	Lough View Bell Lad
Lough View Rosebloom 4th	Vol. 36	273	6	3,407	4·94	168·4	230	Jr. 2	.. ..	Lough View Bell Lad
Rivery Park Radio ..	35796	273	8	6,131	4·31	264·2	350	Mature	316 ..	Rivery Park Midnight
Woodyer, P. A., Mornington, Jersey (2).										
Newlands Lady Mercedes	Vol. 31	273	23	5,649	6·11	345·3	230	Jr. 2	.. ..	Grangelea Pretty Mac
Newlands Pretty Jessie ..	Vol. 31	273	6½	4,580	5·69	260·7	230	Jr. 2	.. ..	Grangelea Pretty Mac

Cement-coated Hessian for Poultry Houses

A lasting, cheap, and effective method of covering free-range poultry houses, or indeed any poultry shed is by means of cement-coated hessian or bags. The hessian or bag is firmly nailed to a solidly built frame and dampened about half-an-hour prior to applying the wash. Carry out the painting on a cool day or in late afternoon, and keep the surface damp for three days, using a fine spray. The formula for the mixture is—water 1¼ gallons, cement 12 lb., lime 2 lb., salt 1 lb., alum ½ lb.

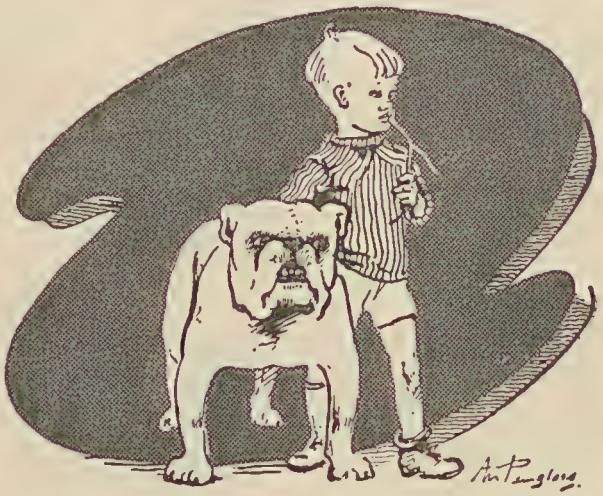


A portable fowlhouse roofed with cement-coated hessian.

Sieve the salt and lime through a fine sieve. Add this to the water and then follow with the cement, stirring while adding. Finally add the alum. The approximate coverage of this quantity of material for three coats is 8 square yards.

Apply this mixture to the stretched bags immediately, with a fairly stiff brush, first on the outside and then, if possible, on the inside. Before the mixture sets, but after the initial wetness disappears, apply a second coat to the outside. When this sets, the bags will be hard and stiff. Subsequent coatings will, of course, make a stronger covering.

[Contributed by the LIVE STOCK DIVISION.



"It's a One Man World

for us and that man is at the War. He went to Malaya and he can't come home until the war is over. Will you help to bring him back soon?"

You *can* help. You can help by eliminating waste, by spending less and saving all that can be reasonably saved. Shorten the war by SAVING: hasten the return of those men who "can't come home until the war is over."

Buy Peace by Saving

STATE SAVINGS BANK OF VICTORIA

Make This Bank YOUR Bank